

# Analytical HPLC Column Introduction

## Grace® Key Column Families

### Single-Source Solution for Discovery to Recovery Applications

HPLC is commonly used in a wide range of applications, including drug discovery and purification for the pharmaceutical and biotechnology industries, environmental analysis, forensics, petrochemical analysis, food, cosmetics, and vitamins. The combined premier product lines of Alltech®, Davisil®, Flexit™, Grom™, Jones Chromatography™, Modcol®, and Vydac® create a single-source solution for HPLC columns and accessories from discovery to recovery.

Our column families include reversed-phase, normal-phase, HILIC, ion-exchange, ion-exclusion, size-exclusion, and affinity stationary phases for small- and large-molecule separations, and our column formats maximize their performance. Our product range includes standard and custom columns for analytical separations, preparative phases for scale up, bulk packings that customers can pack in their own columns, and accessories to maintain separation ruggedness and quality.

To help select the appropriate column for your application, we describe key column families and highlight unique phases within these families. Whether the most important factor is analysis speed, column bleed, pH stability, resolution, adjustable selectivity, or analyte molecular weight, Grace offers a column to suit your application.



#### more info

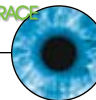
For information about Grace® analytical hardware formats, see page 31.

#### more info

For information about prep columns, see pages 148–171.

## Column Families Suitable for Small Molecules (<2000 Molecular Weight)

### VisionHT™ Ultra High-Pressure Columns



**12,000psig pressure-rated columns, with sub 2µm media for high-efficiency, high-speed separations**

*VisionHT™ columns are optimized for high throughput and ultra high-pressure LC applications. Mechanically stable 1.5µm media and ultra-low volume hardware delivers new separation benefits with excellent stability. A variety of phases available.*

**Differentiated Phases:** C18, C10-B, C18-P, C18-HL, HILIC, Silica

**Specifications:** Spherical silica, monomerically bonded, proprietary endcapping, 100, 120Å pore size

**Formats:** Ultra High-Pressure

### Alltech® Alltima™ HP Columns



**Premium quality, exceptionally stable columns, without phase bleed**

*Alltech® Alltima™ HP phases are made from high purity silica to eliminate peak tailing. Proprietary bonding eliminates the problem of column bleed for MS and ELSD detection. Full range of phases with pH stability from 1 to 10.*

**Differentiated Phases:** C18 for classic reversed-phase separations, EPS for extended polar selectivity, C18 HiLoad for extra reversed-phase retention, C18 Amide with low bleed, and HILIC.

**Specifications:** High purity spherical silica, monomerically bonded, endcapped, 100, 120, 190Å pore size

**Formats:** Microbore, Expedite™, Rocket™, Solvent-Reducer, Analytical, Prep

### Alltech® Prevail™ Columns



**Reversed-phase columns for use with 100% organic to 100% aqueous mobile phases**

*Prevail™ phases are designed for wettability with aqueous and organic mobile phases, and are especially useful for broad gradients. Retain highly polar analytes with aqueous mobile phases as well as hydrophobic analytes in organic mobile phases.*

**Differentiated Phases:** Carbohydrate ES, Organic Acid

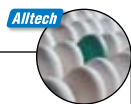
**Specifications:** Spherical silica, monomerically bonded, endcapped, 110Å pore size

**Formats:** Microbore, Expedite™, Rocket™, Solvent-Reducer, Analytical, Prep

# Analytical HPLC Column Introduction

Column Families Suitable for Small Molecules  
(<2000 Molecular Weight) (continued)

## Alltech® Platinum™ Columns



**Alternate retention and selectivity for polar and nonpolar analytes available in sub 2µm particle sizes**

Alltech® Platinum™ phases have a controlled polar silica surface which provides enhanced polar selectivity (EPS) in addition to reversed-phase retention. C18 and EPS C18 columns are a complimentary duo to separate polar and nonpolar analytes.

**Differentiated Phases:** C18, EPS C18

**Specifications:** Spherical silica, monomerically bonded, proprietary endcapping, 100Å pore size

**Formats:** Microbore, Expedite™, Rocket™, Solvent-Reducer, Analytical, Prep

## GraceSmart™ Columns



**Classic reversed-phase and premium performance at an exceptional value**

GraceSmart™ HPLC phases use high purity silica. Which translates into symmetrical peaks for acids and bases, and predictable reversed-phase selectivity. Whether routine analysis or new method development, use individually tested GraceSmart™ columns to get premium performance at exceptional value.

**Differentiated Phases:** C18

**Specifications:** Spherical silica, monomerically bonded, endcapped, 120Å pore size

**Format:** Analytical

## GraceAlpha™ Columns



**A New Silica Generation**

New silica from Grace with high porosity surface and dense core ideal for scale-up applications. While high porosity surface increases mass transfer results in increased column efficiencies and loading capacity, dense core and highly spherical shape yields mechanically robust particle.

**Differentiated Phases:** C18, C8, and Silica

**Specifications:** High purity spherical silica with high porosity surface and dense core

**Formats:** Analytical, Prep

Column Families Suitable for Large Molecules  
(>2000 Molecular Weight)

## Vydac® MS Columns



**Next generation Vydac® media from the leader in peptide and protein separations**

Vydac® MS columns provide unique selectivity and exceptional protein recovery. They require less TFA in the mobile phase for good peak shape, which increases microbore sensitivity of peptides and proteins by reducing “quenching”. Vydac® MS columns are also applicable to hydrophobic proteins and peptide mapping.

**Differentiated Phases:** C18, C8, C4

**Specifications:** Spherical silica, polymerically and monomerically bonded, endcapped, 300Å pore size

**Formats:** Capillary, Microbore, Expedite™, Rocket™, Solvent-Reducer, Analytical, Prep

## Vydac® ProZap™ Columns



**High-speed, high-efficiency columns for fast protein analysis**

Short 10 and 20mm ProZap™ columns with 1.5µm particles provide high-speed protein and life science separations. Sharp, efficient peaks maximize method sensitivity.

**Differentiated Phases:** C18

**Specifications:** Sub 2µm spherical silica, proprietary bonding and endcapping, 500Å pore size

**Format:** Expedite™

## Vydac® Everest® Columns



**For peptide separations, peptide mapping and proteomics applications**

High-capacity Everest® C18 columns are recommended as the first choice in peptide separations. Everest® offer high capacity to resolve complex samples such as protein digests.

**Differentiated Phases:** C18

**Specifications:** Spherical silica, monomerically bonded, endcapped, 300Å pore size

**Formats:** Capillary, Microbore, Expedite™, Analytical

# HPLC Column Selection

## A Comparison of Reversed-Phase Columns

Based on the widely accepted work and data of Drs. Lloyd Snyder and John Dolan<sup>1,2</sup> Grace has developed this column selection tool for choosing reversed phase HPLC columns based on peak capacities and column selectivity of polar and nonpolar compounds. Typically, chromatographers choose HPLC columns by comparing physical characteristics, such as surface area and carbon load. Often, this does not provide enough information about selectivity or capacity for adequate column selection. This chart provides a reliable means of choosing HPLC columns based on acidic, basic, and hydrophobic character.

The Snyder/Dolan column test procedure has been described in a series of publications. Based on retention data for a series of standard mixtures and the same separation conditions (50% acetonitrile/buffer; pH 2.8 and 7.0; 35°C), reversed-phase columns are characterized by five column-selectivity parameters: hydrophobicity (H), steric interaction (S\*), hydrogen-bond acidity (A), basicity (B), and relative silanol ionization or cation-exchange capacity (C). Here we have chosen to graphically highlight data for H, A, and C, with C results at pH 7.0. Hydrophobicity (H) is often the primary analyte interaction with reversed phase columns and indicates overall capacity. Secondary interactions are often polar interactions with basic analytes. The degree of unprotonated base interaction (A) and protonated base interaction (C) with the packing material is measured and represented here.

### Directions for Using the Column Chart

The chart lists the columns in descending order of hydrophobic capacity (H). To find similar HPLC columns to test as back-up columns, follow these steps.

- 1) Find the column you are currently using and note neighboring columns which have similar (H) capacity factors.
- 2) Compare the values for interaction of polar compounds (A and C).

If there is more than one choice for a back-up column, then compare your actual sample to the test probes. If your sample is nonpolar, then place more emphasis on hydrophobic values. If your sample is basic (polar), then pay special attention to A and C and determine if your sample will be protonated (A) or unprotonated (C) and place greater emphasis on one of these values.

### Key to Chart

- Hydrophobic Indicator
- Hydrogen bonding Indicator—pH 2.8 (Protonated under acidic conditions)
- Cation Exchange Indicator—pH 7.0 (Unprotonated under neutral conditions)

Manufacturer	Column	Selectivity Parameters	
ZirChrom	ZirChrom®-PBD C18	A C	1.284
YMC	J'Sphere® H80 C18	C A	1.132
Restek	Allure® C18	C A	1.116
Phenomenex	Ultrasorb® ODS (30)	C A	1.114
YMC	YMC® Pack Pro C18 RS	C A	1.114
Grace (Alltech)	Adsorbosphere™ UHS C18	C A	1.103
Thermo/Hypersil	Hypersil® BetamaxNeutral C18	C A	1.098
Agilent	Zorbax Extend C18	C A	1.098
Agilent	Zorbax C18	C A	1.089
Beckman	Ultrasphere® ODS	C A	1.085
Grace (Alltech)	Alltima™ HP C18 High Load	C A	1.080
Agilent	Zorbax Rx-18	C A	1.077
Agilent	Zorbax Eclipse XDB-C18	C A	1.077
Supelco	Ascentis® C18	C A	1.077
Macherey Nagel	Nucleodur® C18 Gravity	C A	1.056
Grace (Grom)	Grom™ Sapphire 110 C18	C A	1.055
Restek	Restek® Ultra C18	C A	1.055
Varian	OmniSpher™ 5 C18	C A	1.055
Grace (Vydac)	Denali® 120 C18	C A	1.052
Waters	Symmetry® C18	C A	1.052
Akzo Nobel	Kromasil® 100-5C18	C A	1.051
Waters	Nova-Pak® C18	C A	1.049
Thermo/Hypersil	Hypersil® 100 C18	C A	1.048
MacMod/ACT	ACE® 5 C18-HL	C A	1.045
ZirChrom	ZirChrom®-EZ C18	A C	1.040
Grace (Grom)	Grom™ Sil 120 ODS-5 ST	C A	1.035
Dionex	Acclaim® 120 C18	C A	1.032
Waters	Sunfire™ C18	C A	1.031
Agilent	Zorbax Eclipse Plus C18	C A	1.030
Merck	Supspher® 100 RP-18e	C A	1.030
Shiseido	CAPCELL™ C18 AG120	C A	1.030
Grace (Grom)	Grom™ Sil 120 ODS-3 CP	C A	1.029
Waters	Delta-Pak™ C18 100A	C A	1.028
Macherey Nagel	Nucleodur® Isis	C A	1.023
Phenomenex	Prodigy™ ODS (3)	C A	1.023
Phenomenex	Synergi™ Hydro-RP C18	C A	1.022
Phenomenex	Luna™ C18	C A	1.018
Supelco	Supelcosil™ LC-18	C A	1.018
YMC	YMC® Pro C18	C A	1.015
Phenomenex	Onyx™ Monolithic C18	C A	1.012
Bischoff	ProntoSIL™ SphenBOND 80-5-ODS2	C A	1.010
Grace (Jones)	Apex™ II C18	C A	1.008
Shiseido	CAPCELL™ C18 UG120	C A	1.007
GL Sciences	Inertsil® ODS-2	C A	1.007

Manufacturer	Column	Selectivity Parameters	
Merck	LiChrospher® 100 RP-18	C A	1.006
Bischoff	ProntoSIL™ 120-5-C18 H	C A	1.005
Shiseido	CAPCELL™ C18 M G	C A	1.005
Grace (Jones)	Genesis® 120 C18	C A	1.005
Bischoff	EU Reference Column C18	C A	1.004
Grace (Alltech)	Allsphere™ ODS2	C A	1.004
Merck	Purospher® STAR RP18e	C A	1.003
Merck	Chromolith® RP18e	C A	1.003
Phenomenex	Luna® C18(2)	C A	1.002
Varian	Pursuit® C18	C A	1.001
MacMod/ACT	ACE® 5 C18	C A	1.000
Tosoh	TSKge® Super-ODS	C A	0.998
Agilent	Zorbax StableBond 80A C18	C A	0.996
Phenomenex	Prodigy™ ODS(2)	C A	0.995
Thermo/Hypersil	Hypersil® BDS C18	C A	0.993
Grace (Alltech)	Alltima™ C18	C A	0.993
Grace (Vydac)	Vydac® Everest® C18	C A	0.993
Thermo/Hypersil	Hypersil® Beta Basic-18	C A	0.993
GL Sciences	Inertsil® ODS-3	C A	0.990
Grace (Alltech)	Adsorbosphere™ C18	C A	0.989
Phenomenex	Synergi™ Max-RP C18	C A	0.989
Shiseido	CAPCELL™ C18 SG120	C A	0.987
Grace (Jones)	Apex™ I C18	C A	0.985
Thermo/Hypersil	Hypersil® ODS-2	C A	0.985
Grace (Alltech)	Alltima™ HP C18	C A	0.985
Waters	Xterra® MS C18	C A	0.984
Waters	Symmetry® 300 C18	C A	0.984
Supelco	Discovery C18	C A	0.984
Supelco	Supelcosil™ LC-18-DB	C A	0.979
Waters	Spherisorb® S5 ODSB	C A	0.975
Thermo/Hypersil	Hypersil® Bio Basic-18	C A	0.974
Thermo/Hypersil	Hypersil® ODS	C A	0.974
Bischoff	ProntoSIL™ 120-5-C18-AQ	C A	0.974
Grace (Jones)	Genesis® 300 C18 C18	C A	0.974
Bischoff	Prontosil™ 200-5-C18 AQ	C A	0.974
Agilent	Zorbax C8	C A	0.974
Tosoh	TSK ge® ODS-80Ts	C A	0.971
Waters	Resolve C18	C A	0.968
Phenomenex	Gemin® C18 110A	C A	0.967
Grace (Alltech)	Econosil™ C18	C A	0.966
Phenomenex	Aqua® C18	C A	0.966
YMC	YMC® ODS-AQ C18	C A	0.965
Waters	Spherisorb® ODS-2	C A	0.962
Macherey Nagel	Nucleosil® 100-5-C18 HD C18	C A	0.961

Grace (Jones)	Genesis® 120 AQ C18	⊕ ⊕	0.960
Macherey Nagel	Nucleodur® Pyramid	⊕ ⊕	0.958
ThermoHypersil	Hypersil® Elite C18	⊕ ⊕	0.958
Dionex	Acclaim® 300 C18	⊕ ⊕	0.957
Bischoff	ProntoSIL™ 300-5-C18 H	⊕ ⊕	0.956
Waters	Delta-Pak™ C18 300A	⊕ ⊕	0.955
Bischoff	ProntoSIL™ HyperSORB 120 ODS	⊕ ⊕	0.951
ThermoHypersil	Hypersil® PAH C18	⊕ ⊕	0.949
Bischoff	ProntoSIL™ 120-5-C18 Agplus	⊕ ⊕	0.947
Phenomenex	Jupiter® 300 C18	⊕ ⊕	0.945
Varian	Polaris® C18-Ether	⊕ ⊕	0.943
Waters	Atlantis® T3 C18	⊕ ⊕	0.941
Tosoh	TSKgel® 80Ts QA	⊕ ⊕	0.940
Grace (Alltech)	Alltima™ C18-WP	⊕ ⊕	0.938
Waters	YMC® Hydrosphere C18	⊕ ⊕	0.937
Grace (Alltech)	Brava™ BDS C18	⊕ ⊕	0.938
Bischoff	ProntoSIL™ 60-5-C8 SH	⊕ ⊕	0.929
Varian	Polaris® C18-A	⊕ ⊕	0.928
YMC	J'Sphere® M80 C18	⊕ ⊕	0.926
Agilent	Zorbax Eclipse XDB-C8	⊕ ⊕	0.919
Waters	Atlantis® oC18 b	⊕ ⊕	0.917
Supelco	Ascentis® Express C8	⊕ ⊕	0.915
Thermo	Hypersil® GOLD aQ	⊕ ⊕	0.915
Phenomenex	Selectosil™ C18	⊕ ⊕	0.911
Merck	LiChrosorb® RP-18	⊕ ⊕	0.909
Grace (Vydac)	Vydac® 218TP C18	⊕ ⊕	0.909
Waters	Acquity UPLC® BEH Shield RP18 EP	⊕ ⊕	0.907
Macherey Nagel	Nucleosil® C18	⊕ ⊕	0.906
Agilent	Zorbax StableBond 300A C18	⊕ ⊕	0.905
Grace (Alltech)	Prospere® C18 300	⊕ ⊕	0.903
Grace (Vydac)	Vydac® 201TP C18	⊕ ⊕	0.901
Supelco	Ascentis® C-8	⊕ ⊕	0.899
Waters	Nova-Pak® C8	⊕ ⊕	0.899
Waters	Symmetry® C8	⊕ ⊕	0.893
YMC	YMC® Pro C8	⊕ ⊕	0.890
Agilent	Zorbax Eclipse Plus C8	⊕ ⊕	0.889
Phenomenex	Luna™ C8(2)	⊕ ⊕	0.889
Grace (Alltech)	Prevail™ C18	⊕ ⊕	0.888
Grace (Alltech)	Prospere™ 100 C18	⊕ ⊕	0.883
Grace (Alltech)	Alltima™ AQ EP	⊕ ⊕	0.882
ThermoHypersil	Hypersil® GOLD C18	⊕ ⊕	0.881
Phenomenex	Synergi™ Fusion-RP EP	⊕ ⊕	0.879
Phenomenex	Luna™ C8	⊕ ⊕	0.875
Grace (Grom)	Grom™ Sil 120 Octyl-6 MB C8	⊕ ⊕	0.872
Grace (Jones)	Apex™ I C8	⊕ ⊕	0.869
Shiseido	CAPCELL™ C18 A Q	⊕ ⊕	0.867
Macherey Nagel	Nucleosil® 100-5-C8 HD	⊕ ⊕	0.865
Akzo Nobel	Kromasil® 100-5C8	⊕ ⊕	0.864
Grace (Jones)	Genesis® 120 EC C8	⊕ ⊕	0.863
Grace (Alltech)	Prevail™ Amide EP	⊕ ⊕	0.862
Macherey Nagel	Nucleosil® ODS	⊕ ⊕	0.860
Restek	Ultra AQ C18	⊕ ⊕	0.857
Waters	Sunfire™ C8	⊕ ⊕	0.856
Waters	Acquity UPLC® BEH C8	⊕ ⊕	0.855
Shiseido	CAPCELL™ PAK C8 UG120	⊕ ⊕	0.854
Waters	Symmetry® Shield C18	⊕ ⊕	0.850
Grace (Alltech)	Alphabond™ C18	⊕ ⊕	0.845
Supelco	Ascentis® RP-Amide	⊕ ⊕	0.843
Merck	Purospher® RP-18	⊕ ⊕	0.841
Supelco	Discovery BIO Wide pore C8	⊕ ⊕	0.839
Grace (Grom)	Grom™ Sapphire 110 C8	⊕ ⊕	0.835
ThermoHypersil	Hypersil® Beta Basic-8	⊕ ⊕	0.834
Grace (Alltech)	Alltima™ HP C8	⊕ ⊕	0.834
ThermoHypersil	Hypurity® C8	⊕ ⊕	0.833
Supelco	Discovery C8	⊕ ⊕	0.832
GL Sciences	Inertsil® C8-3 C8	⊕ ⊕	0.830
MacMod/ACT	ACE® 5 C8	⊕ ⊕	0.830
Grace (Jones)	Genesis® 120 C8	⊕ ⊕	0.829
Thermo	Hypersil® GOLD C8	⊕ ⊕	0.825
Phenomenex	Oryx™ Monolithic C8	⊕ ⊕	0.824
Tosoh	TSKgel® Super-Octyl	⊕ ⊕	0.824
Grace (Alltech)	Prevail™ Select C18	⊕ ⊕	0.822
ThermoHypersil	Hypersil® Bio Basic-8	⊕ ⊕	0.821
YMC	YMC® Basic C18	⊕ ⊕	0.821
Grace (Alltech)	Econosphere™ C18	⊕ ⊕	0.818
Tosoh	TSKgel® Octyl-80Ts	⊕ ⊕	0.814
Whatman	Partisil™ ODS(3)	⊕ ⊕	0.810

Macherey Nagel	Nucleodur® Sphinx RP	⊕ ⊕	0.805
ThermoHypersil	Aquasil™ C18	⊕ ⊕	0.805
MacMod/ACT	ACE® AQ EP	⊕ ⊕	0.804
Waters	Xterra® MS C8	⊕ ⊕	0.803
Phenomenex	Luna™ C5	⊕ ⊕	0.800
Waters	MicroBondapak C18	⊕ ⊕	0.798
Agilent	Zorbax StableBond 80A C8	⊕ ⊕	0.795
Agilent	Zorbax Rx-C8	⊕ ⊕	0.792
Grace (Alltech)	Platinum™ C18	⊕ ⊕	0.786
Grace	VisionHT™ C18	⊕ ⊕	0.786
Phenomenex	Luna™ Phenyl-Hexyl	⊕ ⊕	0.782
Grace (Alltech)	Alltima™ C18-LL	⊕ ⊕	0.780
Bischoff	ProntoSIL™ 120-5-C18 ace-EPS	⊕ ⊕	0.772
Grace (Vydac)	Vydac® 218MS C18	⊕ ⊕	0.770
Waters	Acquity UPLC® BEH phenyl	⊕ ⊕	0.764
Waters	Spherisorb® C8	⊕ ⊕	0.763
YMC	J'Sphere® L80 C18	⊕ ⊕	0.762
Bischoff	ProntoSIL™ 300-55-C18 ace-EPS	⊕ ⊕	0.762
Dionex	Acclaim® Organic Acid C18	⊕ ⊕	0.761
Waters	Xterra® C18 RP	⊕ ⊕	0.757
Grace (Alltech)	Alltima™ C8	⊕ ⊕	0.756
Whatman	Partisil™ C8	⊕ ⊕	0.749
Merck	LiChrospher® 60 RP-Select B C18	⊕ ⊕	0.747
Bischoff	ProntoSIL™ 120-5 C8 SH	⊕ ⊕	0.739
Grace (Alltech)	Allisphere™ ODS1	⊕ ⊕	0.733
Waters	Symmetry® Shield C8	⊕ ⊕	0.730
ThermoHypersil	Hypurity® C4	⊕ ⊕	0.713
MacMod/ACT	ACE® 5 C4-300	⊕ ⊕	0.710
Varian	Polaris® C8-Ether	⊕ ⊕	0.705
Bischoff	ProntoSIL™ 60-5-Phenyl	⊕ ⊕	0.705
Waters	Nova-Pak® Phenyl	⊕ ⊕	0.704
Macherey Nagel	Nucleosil® 100-5-C18 Nautilus	⊕ ⊕	0.702
Agilent	Zorbax StableBond 300A C8	⊕ ⊕	0.701
Bischoff	ProntoSIL™ SpheriBOND 80-5-ODS1	⊕ ⊕	0.700
ThermoHypersil	Fluophase® RP F	⊕ ⊕	0.698
Phenomenex	Jupiter® 300 C4	⊕ ⊕	0.698
Grace (Alltech)	Prospere® 300 C4	⊕ ⊕	0.689
Bischoff	Prontosil™ 60-5-C4	⊕ ⊕	0.686
Waters	Xterra® Phenyl	⊕ ⊕	0.683
Waters	Spherisorb® ODS-1	⊕ ⊕	0.682
ThermoHypersil	Hypersil® Prism C18 RPN	⊕ ⊕	0.678
ThermoHypersil	Fluophase® PFP F	⊕ ⊕	0.675
Agilent	Zorbax XDB-Phenyl	⊕ ⊕	0.665
Waters	Symmetry® 300 C4	⊕ ⊕	0.659
Waters	Xterra® C8 RP	⊕ ⊕	0.657
Grace (Alltech)	Alltima™ HP C18 EPS	⊕ ⊕	0.655
Supelco	Discovery BIO Wide pore C5	⊕ ⊕	0.654
Agilent	Zorbax Bonus RP EP	⊕ ⊕	0.654
Phenomenex	Synergi™ Polar-RP C18	⊕ ⊕	0.654
MacMod/ACT	ACE® Phenyl	⊕ ⊕	0.647
Grace (Jones)	Genesis® 120 C4 EC	⊕ ⊕	0.646
ThermoHypersil	Hypersil® Prism C18 RP	⊕ ⊕	0.645
ThermoHypersil	BetaMax® Acid EP	⊕ ⊕	0.635
Supelco	Discovery HS F5 F	⊕ ⊕	0.631
Agilent	Zorbax SB-Phenyl	⊕ ⊕	0.623
Grace (Alltech)	Platinum™ EPS C18	⊕ ⊕	0.619
Grace	VisionHT™ C18-P	⊕ ⊕	0.619
Grace (Alltech)	Prevail™ C8	⊕ ⊕	0.617
Grace (Jones)	Genesis® 300 C4 C4	⊕ ⊕	0.615
Grace (Jones)	Genesis® Phenyl	⊕ ⊕	0.609
Agilent	Zorbax StableBond 80A C3	⊕ ⊕	0.601
MacMod/ACT	ACE® Phenyl-300	⊕ ⊕	0.599
Agilent	Zorbax SB-AQ EP	⊕ ⊕	0.593
ZirChrom	ZirChrom®-PS EP	⊕ ⊕	0.589
Waters	MicroBondapak Phenyl	⊕ ⊕	0.585
Grace (Alltech)	Platinum™ C8	⊕ ⊕	0.584
Grace (Alltech)	Platinum™ EPS C8 300	⊕ ⊕	0.584
ThermoHypersil	BetaBasic® Phenyl	⊕ ⊕	0.582
Macherey Nagel	Nucleosil® C8	⊕ ⊕	0.575
Macherey Nagel	EC Nucleosil® 100-5 Protect 1 EP	⊕ ⊕	0.544
Bischoff	Prontosil™ 120-5-C8 ace-EPS	⊕ ⊕	0.532
Phenomenex	Prodigy™ Phenyl-3	⊕ ⊕	0.529
Agilent	Zorbax StableBond 300A C3	⊕ ⊕	0.526
Grace (Alltech)	Alltima™ HP C18 Amide	⊕ ⊕	0.497
ThermoHypersil	BetaMax® Base EP	⊕ ⊕	0.470
Grace (Alltech)	Platinum™ EPS C8	⊕ ⊕	0.420
ThermoHypersil	Hypurity® Advance	⊕ ⊕	0.412

References:

1. "The "Hydrophobic-subtraction" Model of Reversed-phase Column Selectivity", L.R. Snyder, J.W. Dolan and P.W. Carr, *J. Chromatogr. A*, 1060 (2004) 77-116.
2. "A New Look at the Selectivity of Reversed-phase HPLC Columns", L.R. Snyder, J.W. Dolan and P.W. Carr, *Anal. Chem.*, 79 (2007) 3255-3262.

# Grace® HPLC Packing Material Specifications

hplc columns | introduction

Columns for Small Molecules											
Brand	Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	End-capped?	USP L-code	
<b>Adsorbosil®</b> <i>Alltech</i>	C18	Silica	Irregular	5, 10µm	60Å	450m <sup>2</sup> /g	15%	Polymeric	Yes	L1	
	C8	Silica	Irregular	5, 10µm	60Å	450m <sup>2</sup> /g	10%	Polymeric	Yes	L7	
	C2	Silica	Irregular	5, 10µm	60Å	450m <sup>2</sup> /g	No	Polymeric	No	L16	
	CN	Silica	Irregular	5, 10µm	60Å	450m <sup>2</sup> /g	—	Polymeric	Yes	L10	
	NH <sub>2</sub>	Silica	Irregular	5, 10µm	60Å	450m <sup>2</sup> /g	—	Polymeric	No	L8	
<b>Adsorbosphere™</b> <i>Alltech</i>	Silica	Silica	Irregular	5, 10µm	60Å	450m <sup>2</sup> /g	—	Polymeric	No	L3	
	C18	Silica	Spherical	3, 5, 10µm	80Å	200m <sup>2</sup> /g	12%	Monomeric	Yes	L1	
	C18 HS	Silica	Spherical	3, 5µm	60Å	350m <sup>2</sup> /g	20%	Monomeric	Yes	L1	
	C18 UHS	Silica	Spherical	5, 10µm	60Å	500m <sup>2</sup> /g	30%	Monomeric	Yes	L1	
	C8	Silica	Spherical	3, 5, 10µm	80Å	200m <sup>2</sup> /g	8%	Monomeric	Yes	L7	
	Phenyl	Silica	Spherical	5µm	80Å	200m <sup>2</sup> /g	5%	Monomeric	Yes	L11	
	Cyano	Silica	Spherical	5µm	80Å	200m <sup>2</sup> /g	—	Monomeric	Yes	L10	
	Cyano-AQ	Silica	Spherical	5µm	120Å	170m <sup>2</sup> /g	—	Polymeric	No	L10	
	Amino (NH <sub>2</sub> )	Silica	Spherical	3, 5µm	80Å	200m <sup>2</sup> /g	—	Polymeric	No	L8	
	Silica	Silica	Spherical	5µm	80Å	200m <sup>2</sup> /g	—	—	No	L3	
	SAX	Silica	Spherical	5µm	80Å	200m <sup>2</sup> /g	—	Monomeric	No	—	
	SCX	Silica	Spherical	5µm	80Å	200m <sup>2</sup> /g	—	Monomeric	Yes	—	
<b>Adsorbosphere™ XL</b> <i>Alltech</i>	C18	Silica	Spherical	3, 5µm	90Å	200m <sup>2</sup> /g	11%	Monomeric	Yes	L1	
	C18-B	Silica	Spherical	5µm	90Å	200m <sup>2</sup> /g	12%	Monomeric	Yes	L1	
	C8	Silica	Spherical	3, 5µm	90Å	200m <sup>2</sup> /g	6%	Monomeric	Yes	L7	
	C1 (TMS)	Silica	Spherical	5µm	90Å	200m <sup>2</sup> /g	—	Monomeric	Yes	L13	
	Silica	Silica	Spherical	5µm	90Å	200m <sup>2</sup> /g	—	—	No	L3	
	SAX	Silica	Spherical	5, 10µm	90Å	200m <sup>2</sup> /g	—	Monomeric	Yes	—	
	SCX	Silica	Spherical	5, 10µm	90Å	200m <sup>2</sup> /g	—	Monomeric	Yes	—	
<b>Allsphere™</b> <i>Alltech</i>	ODS-1	Silica	Spherical	5µm	80Å	220m <sup>2</sup> /g	7%	Monomeric	Partial	L1	
	ODS-2	Silica	Spherical	3, 5µm	80Å	220m <sup>2</sup> /g	12%	Monomeric	Yes	L1	
	C8	Silica	Spherical	3, 5µm	80Å	220m <sup>2</sup> /g	6%	Monomeric	Yes	L7	
	C6	Silica	Spherical	5µm	80Å	220m <sup>2</sup> /g	4%	Monomeric	Yes	L15	
	C1 (TMS)	Silica	Spherical	5µm	80Å	220m <sup>2</sup> /g	3%	Monomeric	No	L13	
	Phenyl	Silica	Spherical	5µm	80Å	220m <sup>2</sup> /g	3%	Monomeric	Yes	L11	
	Cyano	Silica	Spherical	5µm	80Å	220m <sup>2</sup> /g	3.5%	Monomeric	No	L10	
	Amino (NH <sub>2</sub> )	Silica	Spherical	5µm	80Å	220m <sup>2</sup> /g	3%	Monomeric	No	L8	
	Silica	Silica	Spherical	3, 5µm	80Å	220m <sup>2</sup> /g	—	—	No	L3	
	SAX	Silica	Spherical	5µm	100Å	220m <sup>2</sup> /g	4%	Monomeric	No	—	
	SCX	Silica	Spherical	5µm	100Å	220m <sup>2</sup> /g	4%	Monomeric	No	—	
	<b>Alltima™ HP</b> <i>Alltech</i>	C18	Silica	Spherical	3, 5µm	190Å	200m <sup>2</sup> /g	12%	Monomeric	Yes	L1
C18 EPS		Silica	Spherical	3, 5µm	190Å	200m <sup>2</sup> /g	4%	Monomeric	No	L1	
C18 HiLoad		Silica	Spherical	3, 5µm	100Å	450m <sup>2</sup> /g	24%	Monomeric	Yes	L1	
C18 AQ		Silica	Spherical	3, 5µm	100Å	450m <sup>2</sup> /g	20%	Monomeric	Yes	L1	
C18 Amide		Silica	Spherical	3, 5µm	190Å	200m <sup>2</sup> /g	12%	Monomeric	Yes	L1	
C8		Silica	Spherical	3, 5µm	190Å	200m <sup>2</sup> /g	8%	Monomeric	Yes	L7	
Cyano		Silica	Spherical	3, 5µm	190Å	200m <sup>2</sup> /g	4%	Monomeric	Yes	L10	
Silica		Silica	Spherical	3, 5µm	100Å	450m <sup>2</sup> /g	—	—	No	L3	
HILIC		Silica	Spherical	1.5, 3, 5µm	120Å	230m <sup>2</sup> /g	—	—	No	L3	
C18		Silica	Spherical	3, 5, 10µm	100Å	340m <sup>2</sup> /g	16%	Polymeric	Yes	L1	
<b>Alltima™</b> <i>Alltech</i>	C18 LL	Silica	Spherical	5µm	100Å	340m <sup>2</sup> /g	9%	Polymeric	Yes	L1	
	C8	Silica	Spherical	3, 5, 10µm	100Å	340m <sup>2</sup> /g	9%	Polymeric	Yes	L7	
	Phenyl	Silica	Spherical	3, 5µm	100Å	340m <sup>2</sup> /g	7.5%	Polymeric	Yes	L11	
	Cyano	Silica	Spherical	3, 5µm	100Å	340m <sup>2</sup> /g	—	Polymeric	Yes	L10	
	Amino (NH <sub>2</sub> )	Silica	Spherical	3, 5µm	100Å	340m <sup>2</sup> /g	—	Polymeric	No	L8	
	Silica	Silica	Spherical	3, 5, 10µm	100Å	340m <sup>2</sup> /g	—	—	No	L3	
	<b>AlphaBond™</b> <i>Alltech</i>	C18	Silica	Irregular	5, 10µm	125Å	300m <sup>2</sup> /g	10%	Monomeric	Yes	L1
C8		Silica	Irregular	10µm	125Å	300m <sup>2</sup> /g	—	Monomeric	Yes	L7	
Phenyl		Silica	Irregular	10µm	125Å	300m <sup>2</sup> /g	—	Monomeric	Yes	L11	
Cyano		Silica	Irregular	10µm	125Å	300m <sup>2</sup> /g	—	Monomeric	Yes	L10	
Amino (NH <sub>2</sub> )		Silica	Irregular	10µm	125Å	300m <sup>2</sup> /g	—	Polymeric	No	L8	
Silica		Silica	Irregular	10µm	125Å	300m <sup>2</sup> /g	—	—	No	L3	
<b>Apex™ I</b> <b>JONES</b>		ODS	Silica	Spherical	3, 5, 10µm	100Å	170m <sup>2</sup> /g	10%	Polymeric	Yes	L1
	C8	Silica	Spherical	3, 5µm	100Å	170m <sup>2</sup> /g	7%	Monomeric	No	L7	
	C8(EC)	Silica	Spherical	3, 5µm	100Å	170m <sup>2</sup> /g	7%	Monomeric	Yes	L7	
	C1	Silica	Spherical	3, 5µm	100Å	170m <sup>2</sup> /g	2.5%	Monomeric	Yes	L13	
	Phe	Silica	Spherical	3, 5µm	100Å	170m <sup>2</sup> /g	3%	Monomeric	No	L11	
	Basic ODS	Silica	Spherical	5µm	100Å	200m <sup>2</sup> /g	12%	Monomeric	Yes	L1	
	PAH	Silica	Spherical	5µm	100Å	170m <sup>2</sup> /g	—	Monomeric	Yes	—	
	CN	Silica	Spherical	3, 5µm	100Å	170m <sup>2</sup> /g	4%	Monomeric	No	L10	
	Amino (NH <sub>2</sub> )	Silica	Spherical	3, 5µm	100Å	170m <sup>2</sup> /g	2%	Monomeric	No	L8	
	Carbohydrate	Silica	Spherical	5µm	100Å	170m <sup>2</sup> /g	—	Monomeric	†	—	
	Silica	Silica	Spherical	3, 5, 10µm	100Å	170m <sup>2</sup> /g	—	—	No	L3	
	<b>Apex™ II</b> <b>JONES</b>	ODS	Silica	Spherical	3, 5µm	100Å	170m <sup>2</sup> /g	10.5%	Monomeric	Yes	L1
		Diol	Silica	Spherical	3, 5µm	100Å	170m <sup>2</sup> /g	3.5%	Monomeric	No	—
Amino (NH <sub>2</sub> )		Silica	Spherical	3, 5µm	100Å	170m <sup>2</sup> /g	2%	Monomeric	No	L8	
Others—as Apex I		Silica	Spherical	5µm	100Å	170m <sup>2</sup> /g	—	—	No	—	
<b>Apex™ Prepsil</b> <b>JONES</b>	ODS	Silica	Spherical	8, 15µm	130Å	170m <sup>2</sup> /g	10%	Polymeric	Yes	L1	
	C8	Silica	Spherical	8, 15µm	130Å	170m <sup>2</sup> /g	7%	Monomeric	No	L7	
	C8(EC)	Silica	Spherical	8, 15µm	130Å	170m <sup>2</sup> /g	7%	Monomeric	Yes	L7	
	C2	Silica	Spherical	8µm	130Å	170m <sup>2</sup> /g	2.8%	Monomeric	No	L30	
	CN	Silica	Spherical	8µm	130Å	170m <sup>2</sup> /g	4%	Monomeric	Yes	L10	
	Amino (NH <sub>2</sub> )	Silica	Spherical	8µm	130Å	170m <sup>2</sup> /g	2%	Monomeric	Yes	L8	
	Silica	Silica	Spherical	8, 15µm	130Å	170m <sup>2</sup> /g	—	—	No	L3	
	Diol	Silica	Spherical	8µm	130Å	170m <sup>2</sup> /g	3.2%	Monomeric	No	L20	

†Proprietary.

Columns for Small Molecules (continued)											
Brand	Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	End-capped?	USP L-code	
<b>Apollo™</b> <i>Alltech</i>	C18	Silica	Spherical	5µm	100Å	340m <sup>2</sup> /g	15%	Monomeric	Yes	L1	
	C8	Silica	Spherical	5µm	100Å	340m <sup>2</sup> /g	9%	Monomeric	Yes	L7	
	Phenyl	Silica	Spherical	5µm	100Å	340m <sup>2</sup> /g	8%	Monomeric	Yes	L11	
	Silica	Silica	Spherical	5µm	100Å	340m <sup>2</sup> /g	—	—	No	L3	
<b>Brava™</b> <i>Alltech</i>	C18 BDS	Silica	Spherical	3, 5µm	145Å	185m <sup>2</sup> /g	8.5%	Monomeric	Yes	L1	
	C18 ODS	Silica	Spherical	3, 5µm	130Å	195m <sup>2</sup> /g	8.5%	Monomeric	Yes	L1	
	C8	Silica	Spherical	3, 5µm	130Å	195m <sup>2</sup> /g	6%	Monomeric	Yes	L7	
	C8 BDS	Silica	Spherical	3, 5µm	145Å	185m <sup>2</sup> /g	5.5%	Monomeric	Yes	L7	
	Phenyl	Silica	Spherical	5µm	130Å	195m <sup>2</sup> /g	—	Monomeric	No	L11	
	Cyano	Silica	Spherical	5µm	130Å	195m <sup>2</sup> /g	—	Monomeric	No	L10	
	Cyano BDS	Silica	Spherical	5µm	145Å	185m <sup>2</sup> /g	—	Monomeric	No	L10	
	Amino (NH <sub>2</sub> )	Silica	Spherical	5µm	130Å	195m <sup>2</sup> /g	—	Monomeric	No	L8	
	Silica	Silica	Spherical	5µm	130Å	195m <sup>2</sup> /g	—	—	No	L3	
	<b>Carbohydrate</b> <i>Alltech</i>	Amino	Silica	Irregular	10µm	80Å	550m <sup>2</sup> /g	—	Polymeric	No	—
Cation		Polymer	Spherical	10µm	—	—	—	—	No	—	
<b>Denali®</b> <i>VDAC</i>	238DE C18	Silica	Spherical	3, 5, 10, 15, 20µm	120Å	280-340m <sup>2</sup> /g	20%	Monomeric	Yes	L1	
<b>Econosil™*</b> <i>Alltech</i>	C18	Silica	Irregular	3, 5, 10µm	80Å	200m <sup>2</sup> /g	10%	Monomeric	Yes	L1	
	C8	Silica	Irregular	3, 5, 10µm	80Å	200m <sup>2</sup> /g	5%	Monomeric	Yes	L7	
	CN	Silica	Irregular	5, 10µm	80Å	200m <sup>2</sup> /g	—	Monomeric	Yes	L10	
	NH <sub>2</sub>	Silica	Irregular	5, 10µm	80Å	200m <sup>2</sup> /g	—	Polymeric	No	L8	
	Silica	Silica	Irregular	3, 5, 10µm	80Å	200m <sup>2</sup> /g	—	—	No	L3	
<b>Econosphere™*</b> <i>Alltech</i>	C18	Silica	Spherical	3, 5, 10µm	80Å	200m <sup>2</sup> /g	10%	Monomeric	Yes	L1	
	C8	Silica	Spherical	3, 5, 10µm	80Å	200m <sup>2</sup> /g	5%	Monomeric	Yes	L7	
	Cyano	Silica	Spherical	5µm	80Å	200m <sup>2</sup> /g	—	Monomeric	Yes	L10	
	Amino (NH <sub>2</sub> )	Silica	Spherical	5µm	80Å	200m <sup>2</sup> /g	—	Polymeric	No	L8	
	Silica	Silica	Spherical	3, 5, 10µm	80Å	200m <sup>2</sup> /g	—	—	No	L3	
<b>Genesis® 120</b> <i>JONES</i>	C18	Silica	Spherical	3, 4, 7, 15µm	120Å	300m <sup>2</sup> /g	18%	Monomeric	Yes	L1	
	C18 AQ	Silica	Spherical	4, 7µm	120Å	300m <sup>2</sup> /g	15%	Monomeric	Yes	L1	
	C8	Silica	Spherical	3, 4, 7, 15µm	120Å	300m <sup>2</sup> /g	11%	Monomeric	No	L7	
	C8(EC)	Silica	Spherical	3, 4, 7, 15µm	120Å	300m <sup>2</sup> /g	11%	Monomeric	Yes	L7	
	C4	Silica	Spherical	4µm	120Å	300m <sup>2</sup> /g	6%	Monomeric	Yes	L26	
	Phenyl	Silica	Spherical	4µm	120Å	300m <sup>2</sup> /g	9%	Monomeric	Yes	L11	
	CN	Silica	Spherical	3, 4µm	120Å	300m <sup>2</sup> /g	7%	Monomeric	Yes	L10	
	Amino (NH <sub>2</sub> )	Silica	Spherical	3, 4µm	120Å	300m <sup>2</sup> /g	3.5%	Polymeric	No	L8	
	Carbohydrate	Silica	Spherical	4µm	120Å	300m <sup>2</sup> /g	—	Monomeric	No	—	
	CN-TCA	Silica	Spherical	4µm	120Å	300m <sup>2</sup> /g	7%	Monomeric	Yes	—	
	Petro-XP	Silica	Spherical	4µm	120Å	300m <sup>2</sup> /g	—	Monomeric	No	—	
	Silica	Silica	Spherical	3, 4, 7, 15µm	120Å	300m <sup>2</sup> /g	—	—	No	L3	
	<b>Grace Alpha®</b> <i>GRACE</i>	C18	Silica	Spherical	5, 10, 15, 20µm	120Å	325m <sup>2</sup> /g	15%	Monomeric	Yes	L1
		C8	Silica	Spherical	5, 10, 15, 20µm	120Å	325m <sup>2</sup> /g	10%	Monomeric	No	L7
		Silica	Silica	Spherical	5, 10, 15, 20µm	120Å	325m <sup>2</sup> /g	—	—	No	L3
<b>GraceSmart™</b> <i>GRACE</i>	C18	Silica	Spherical	3, 5µm	120Å	220m <sup>2</sup> /g	10%	Monomeric	Yes	L1	
<b>Grom™ Sil</b> <i>GROM</i>	ODS-0 AB (acid/base deactivated)	Silica	Spherical	1.5, 3, 5, 10µm	100Å	200m <sup>2</sup> /g	11%	Monomeric	Yes	L1	
	ODS-2 FE (fully endcapped)	Silica	Spherical	1.5, 3, 5, 10µm	80, 100, 300Å	220, 200, 100m <sup>2</sup> /g	12, 11, 6%	Monomeric	Yes	L1	
	ODS-3 CP (encapsulated)	Silica	Spherical	3, 5, 7, 10µm	120, 300Å	320, 170m <sup>2</sup> /g	15, 6%	Polymeric	No	L1	
	ODS-4 HE (hydrophilic endcapping)	Silica	Spherical	3, 4, 5, 7, 10µm	120, 200Å	300, 200m <sup>2</sup> /g	16, 11%	Monomeric	Yes	L1	
	ODS-5 ST (standard)	Silica	Spherical	3, 4, 5, 7, 10µm	60, 120, 200, 300Å	580, 300, 200, 150m <sup>2</sup> /g	22, 17, 12, 7%	Monomeric	Yes	L1	
	ODS-6 NE (non endcapped)	Silica	Irregular	3, 5µm	120Å	300m <sup>2</sup> /g	17%	Monomeric	No	L1	
	ODS-7 pH (pH-stable)	Silica	Irregular	4µm	80Å	510m <sup>2</sup> /g	22%	Polymeric	No	L1	
	Octyl-1 B (base deactivated)	Silica	Spherical	3, 5µm	100Å	200m <sup>2</sup> /g	6.5%	Monomeric	Yes	L7	
	Octyl-2 AB (acid/base deactivated)	Silica	Spherical	3, 5µm	100Å	200m <sup>2</sup> /g	5%	Monomeric	Yes	L7	
	Octyl-3 BA (for bases)	Silica	Spherical	3, 5µm	120Å	300m <sup>2</sup> /g	9%	Monomeric	Yes	L7	
	Octyl-4 FE (fully endcapped)	Silica	Spherical	3, 5, 10µm	80, 100, 300Å	220, 200, 100m <sup>2</sup> /g	6.6, 6, 3%	Monomeric	Yes	L7	
	Octyl-5 CP (encapsulated)	Silica	Spherical	3, 5, 7, 10µm	120, 300Å	320, 170m <sup>2</sup> /g	10, 5.5%	Polymeric	No	L7	
	Octyl-6 MB (monomer binding)	Silica	Spherical	3, 5, 10µm	120, 200, 300Å	300, 200, 150m <sup>2</sup> /g	10, 7, 4%	Monomeric	Yes	L7	
	Hexyl-1 MB (monomeric bonding)	Silica	Spherical	5µm	80, 100Å	220, 200m <sup>2</sup> /g	4, 4%	Monomeric	Yes	—	
	Phenyl-1 FE (fully endcapped)	Silica	Spherical	3, 5, 10µm	120, 300Å	300, 150m <sup>2</sup> /g	9, 5%	Monomeric	Yes	L11	
	Phenyl-2 CP (encapsulated)	Silica	Irregular	5µm	120, 300Å	320, 170m <sup>2</sup> /g	7, 4%	Polymeric	No	L11	
	Phenyl-3 PE (partially endcapped)	Silica	Spherical	3, 5, 10µm	80, 100Å	220, 200m <sup>2</sup> /g	6.6, 6%	Monomeric	Yes	L11	
	Butyl-1 ST (standard)	Silica	Spherical	3, 5µm	120, 300Å	300, 150m <sup>2</sup> /g	7, 2.5%	Monomeric	No	L26	
	Butyl-2 FE (fully endcapped)	Silica	Spherical	3, 5µm	300Å	100m <sup>2</sup> /g	1, 5%	Monomeric	No	L26	
	TMS-1 ST (standard)	Silica	Spherical	3, 5µm	120, 300Å	300, 150m <sup>2</sup> /g	4%	Monomeric	Yes	L13	
	TMS-2 CP (encapsulated)	Silica	Spherical	3, 5µm	120, 300Å	320, 170m <sup>2</sup> /g	3%	Polymeric	No	L13	
	Cyan-1 ST (standard)	Silica	Spherical	3, 5µm	120, 300Å	300, 150m <sup>2</sup> /g	4.8%	Monomeric	Yes	—	
	Cyan-2 PR (cyanopropyl)	Silica	Spherical	3, 5µm	80, 100Å	220, 200m <sup>2</sup> /g	3.5%	Monomeric	Yes	—	
	Cyan-3 CP (encapsulated)	Silica	Spherical	5µm	120Å	320m <sup>2</sup> /g	4%	Polymeric	No	—	
	Amino-1 PR (NH-propyl)	Silica	Spherical	3, 5, 10µm	80, 100Å	220, 200m <sup>2</sup> /g	2%	Monomeric	Yes	L8	
	Amino-2 PA (cross linked Poly-NH <sub>2</sub> )	Silica	Spherical	5µm	120Å	300m <sup>2</sup> /g	—	Polymeric	No	L8	
	Amino-3 CP (encapsulated NH-residues)	Silica	Irregular	5µm	80Å	420m <sup>2</sup> /g	—	Monomeric	Yes	L8	
	Amino-4 PR (propylamine bonded to silica)	Silica	Irregular	3, 7µm	300Å	100m <sup>2</sup> /g	—	Monomeric	No	L8	
	Diol	Silica	Spherical	5, 10µm	60, 120, 200, 300Å	580, 300, 200, 150m <sup>2</sup> /g	—	Monomeric	No	L20	
	Normal Phase-1 ST (standard silica)	Silica	Spherical	3, 5, 10µm	80, 100, 1000Å	220, 200m <sup>2</sup> /g	—	—	No	L3	
	Normal Phase-2 SP (spherical silica)	Silica	Spherical	3, 5, 10µm	60, 120, 200, 1000Å	580, 300, 200m <sup>2</sup> /g	—	—	No	L3	
	Normal Phase-3 PV (polyvinylalcohol)	Silica	Spherical	5µm	120Å	300m <sup>2</sup> /g	—	Polymeric	No	L3	
	SEC (size exclusion chromatography)	Silica	Spherical	5, 10µm	60, 120, 200, 300Å	580, 300, 200, 150m <sup>2</sup> /g	—	—	No	—	
Strong Anion-1	Silica	Spherical	5, 10µm	80, 100Å	220, 200m <sup>2</sup> /g	—	—	No	—		
Weak Anion-2 (ion exchange)	Silica	Spherical	7µm	300Å	100m <sup>2</sup> /g	—	—	No	—		
Strong Cation-1 (ion exchange)	Silica	Spherical	5, 10µm	80, 100Å	220, 200m <sup>2</sup> /g	—	—	No	—		

\*Available only online.

Columns for Small Molecules (continued)										
Brand	Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	End-capped?	USP L-code
<b>Grom™ Sil (cont.)</b> <b>CRUM</b>	Weak Cation-2 (ion exchange)	Silica	Spherical	7µm	300Å	100m <sup>2</sup> /g	—	—	No	—
	HIC (hydrophobic interaction chrom.)	Silica	Spherical	7µm	300Å	100m <sup>2</sup> /g	—	—	No	—
<b>Grom™ Sapphire</b> <b>CRUM</b>	C18	Silica	Spherical	3, 5, 10µm	65, 110Å	500, 270m <sup>2</sup> /g	23, 16%	Monomeric	Yes	L1
	C8	Silica	Spherical	3, 5, 10µm	65, 110Å	500, 270m <sup>2</sup> /g	15, 10%	Monomeric	Yes	L7
	C4	Silica	Spherical	3, 5, 10µm	65, 110Å	500, 270m <sup>2</sup> /g	10.5, 7%	Monomeric	Yes	L26
	Silica	Silica	Spherical	3, 5, 10µm	65, 110Å	500, 270m <sup>2</sup> /g	—	—	No	L3
<b>Mixed Mode</b> <b>Alltech</b>	C18/Cation	Silica	Spherical	5, 7µm	100Å	350m <sup>2</sup> /g	—	Polymeric	No	—
	C8/Anion	Silica	Spherical	7µm	100Å	350m <sup>2</sup> /g	—	Polymeric	No	—
	C8/Cation	Silica	Spherical	5µm	100Å	350m <sup>2</sup> /g	—	Polymeric	No	—
<b>Platinum™</b> <b>Alltech</b>	C18	Silica	Spherical	1.5, 3, 5µm	100Å	200m <sup>2</sup> /g	6%	Monomeric	Yes	L1
	C18 EPS	Silica	Spherical	1.5, 3, 5µm	100Å	200m <sup>2</sup> /g	5%	Monomeric	No	L1
	C8	Silica	Spherical	1.5, 3, 5µm	100Å	200m <sup>2</sup> /g	4%	Monomeric	Yes	L7
	C8 EPS	Silica	Spherical	3, 5µm	100Å	200m <sup>2</sup> /g	2.5%	Monomeric	No	L7
	Phenyl	Silica	Spherical	3, 5µm	100Å	200m <sup>2</sup> /g	—	Monomeric	Yes	L11
	Cyano	Silica	Spherical	3, 5µm	100Å	200m <sup>2</sup> /g	—	Monomeric	No	L10
	Amino (NH <sub>2</sub> )	Silica	Spherical	3, 5µm	100Å	200m <sup>2</sup> /g	—	Monomeric	No	L8
	Silica	Silica	Spherical	3, 5µm	100Å	200m <sup>2</sup> /g	—	—	No	L3
	SAX	Silica	Spherical	3, 5µm	100Å	200m <sup>2</sup> /g	—	Monomeric	No	—
	<b>Prevail™</b> <b>Alltech</b>	C18 Select	Silica	Spherical	3, 5µm	110Å	350m <sup>2</sup> /g	17%	Monomeric	Yes
C18	Silica	Spherical	3, 5µm	110Å	350m <sup>2</sup> /g	15%	Monomeric	Yes	L1	
C8	Silica	Spherical	3, 5µm	110Å	350m <sup>2</sup> /g	8%	Monomeric	Yes	L7	
Phenyl	Silica	Spherical	3, 5µm	110Å	350m <sup>2</sup> /g	7%	Monomeric	Yes	L11	
Cyano	Silica	Spherical	3, 5µm	110Å	350m <sup>2</sup> /g	—	Monomeric	Yes	L10	
Amino (NH <sub>2</sub> )	Silica	Spherical	3, 5µm	110Å	350m <sup>2</sup> /g	—	Monomeric	No	L8	
Silica	Silica	Spherical	3, 5µm	110Å	350m <sup>2</sup> /g	—	—	No	L3	
Organic Acid	Silica	Spherical	3, 5µm	110Å	350m <sup>2</sup> /g	—	Monomeric	Yes	—	
Carbohydrate ES	Polymer	Spherical	5µm	—	—	—	—	—	No	—
<b>Vydac® SP</b> <b>VYDAC</b>	101SP Sil	Silica	Spheroidal	5, 10µm	100Å	250–350m <sup>2</sup> /g	—	unbonded	No	L3
	201SP C18	Silica	Spheroidal	3, 5, 10, 15µm	90Å	250–350m <sup>2</sup> /g	13%	Monomeric	Yes	L1
	208SP C8	Silica	Spheroidal	5, 10, 15µm	90Å	250–350m <sup>2</sup> /g	9%	Monomeric	Yes	L7
<b>VisionHT™</b> <b>GRACE</b>	C18	Silica	Spherical	1.5µm	100Å	200m <sup>2</sup> /g	6%	Monomeric	Yes	L1
	C-18-B	Silica	Spherical	1.5µm	120Å	220m <sup>2</sup> /g	5.5%	Monomeric	†	L1
	C18-P	Silica	Spherical	1.5µm	100Å	200m <sup>2</sup> /g	5%	Monomeric	No	L1
	C18-HL	Silica	Spherical	1.5µm	120Å	220m <sup>2</sup> /g	11%	Polymeric	†	L1
	HILIC, Silica	Silica	Spherical	1.5µm	120Å	220m <sup>2</sup> /g	—	—	No	L3

Columns for Large Molecules										
Brand	Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	End-capped?	USP L-code
<b>Genesis® 300</b> <b>JONES</b>	C18	Silica	Spherical	4, 7µm	300Å	120m <sup>2</sup> /g	10%	Monomeric	Yes	L1
	C4	Silica	Spherical	4, 7µm	300Å	120m <sup>2</sup> /g	3%	Monomeric	Yes	L26
	CN	Silica	Spherical	4µm	300Å	120m <sup>2</sup> /g	3.3%	Monomeric	Yes	L11
<b>Macrosphere™ 300</b> <b>Alltech</b>	C18	Silica	Spherical	5, 7µm	300Å	100m <sup>2</sup> /g	10%	Monomeric	Yes	L1
	C8	Silica	Spherical	5, 7µm	300Å	100m <sup>2</sup> /g	2.2%	Monomeric	Yes	L7
	C4	Silica	Spherical	5, 7µm	300Å	100m <sup>2</sup> /g	—	Monomeric	Yes	L26
	SAX	Silica	Spherical	7µm	300Å	100m <sup>2</sup> /g	—	Monomeric	No	—
	WAX	Silica	Spherical	7µm	300Å	100m <sup>2</sup> /g	—	Monomeric	No	—
	SCX	Silica	Spherical	7µm	300Å	100m <sup>2</sup> /g	—	Polymeric	No	—
	WCX	Silica	Spherical	7µm	300Å	100m <sup>2</sup> /g	—	Polymeric	No	—
<b>Macrosphere™ GPC</b> <b>Alltech</b>	GPC 60	Silica	Spherical	7µm	60Å	450m <sup>2</sup> /g	—	Polymeric	No	L25
	GPC 100	Silica	Spherical	7µm	100Å	350m <sup>2</sup> /g	—	Polymeric	No	—
	GPC 150	Silica	Spherical	7µm	150Å	200m <sup>2</sup> /g	—	Polymeric	No	—
	GPC 300	Silica	Spherical	7µm	300Å	100m <sup>2</sup> /g	—	Polymeric	No	—
<b>ProSphere™</b> <b>Alltech</b>	C18	Silica	Spherical	3, 5, 10µm	300Å	120m <sup>2</sup> /g	9%	Monomeric	Yes	L1
	C18-AQ	Silica	Spherical	3, 5µm	100Å	450m <sup>2</sup> /g	18%	Monomeric	Yes	L1
	C4	Silica	Spherical	3, 5, 10µm	300Å	120m <sup>2</sup> /g	3%	Monomeric	Yes	L26
	Size-Exclusion 125	Silica	Spherical	4, 5µm	125Å	—	—	—	No	—
	Size-Exclusion 250	Silica	Spherical	4, 5µm	250Å	—	—	—	No	—
	Size-Exclusion 450	Silica	Spherical	8µm	450Å	—	—	—	No	—
	P-HR (reversed phase)	Polymer	Spherical	4µm	140Å	—	—	—	No	—
<b>ProZap™</b> <b>VYDAC</b> <b>Vydac® ATP</b> <b>VYDAC</b> <b>Vydac® TP</b> <b>VYDAC</b>	C18 ProZap™	Silica	Spherical	1.5µm	500Å	59m <sup>2</sup> /g	3%	Monomeric	Yes	L1
	214ATP C4	Silica	Spheroidal	5, 10–15µm	300Å	70–110m <sup>2</sup> /g	3%	Polymeric	Yes	L26
	101TP Sil	Silica	Spheroidal	5, 10, 10–15, 15–20µm	300Å	70–110m <sup>2</sup> /g	—	unbonded	No	L3
	201TP C18	Silica	Spheroidal	5, 7, 10, 10–15, 15–20µm	300Å	70–90m <sup>2</sup> /g	8%	Polymeric	No	L1
	202TP C18	Silica	Spheroidal	3, 5, 10µm	300Å	60–90m <sup>2</sup> /g	9%	Polymeric	No	L1
	208TP C8	Silica	Spheroidal	3, 5, 7, 10, 10–15, 15–20µm	300Å	60–110m <sup>2</sup> /g	5%	Polymeric	Yes	L7
	214TP C4	Silica	Spheroidal	3, 5, 7, 10, 10–15, 15–20µm	300Å	60–110m <sup>2</sup> /g	3%	Polymeric	Yes	L26
	218TP C18	Silica	Spheroidal	3, 5, 7, 10, 10–15, 15–20µm	300Å	60–110m <sup>2</sup> /g	8%	Polymeric	Yes	L1
	219TP Di-Phe	Silica	Spheroidal	3, 5, 7, 10, 10–15, 15–20µm	300Å	60–110m <sup>2</sup> /g	4%	Polymeric	Yes	—
	238TP C18	Silica	Spheroidal	3, 5, 7, 10, 10–15, 15–20µm	300Å	60–110m <sup>2</sup> /g	4%	Monomeric	Yes	L1
<b>Everest®</b> <b>VYDAC</b> <b>Vydac® MS</b> <b>VYDAC</b>	238EV C18	Silica	Spherical	5, 10, 10–15, 15–20µm	300Å	70–110m <sup>2</sup> /g	6%	Monomeric	Yes	L1
	208MS C8	Silica	Spheroidal	5µm	300Å	70m <sup>2</sup> /g	5%	Polymeric	Yes	L7
	214MS C4	Silica	Spheroidal	5µm	300Å	70–110m <sup>2</sup> /g	3%	Polymeric	Yes	L26
	218MS C18	Silica	Spheroidal	3, 5, 10, 10–15µm	300Å	60–110m <sup>2</sup> /g	8%	Polymeric	Yes	L1
	238MS C18	Silica	Spheroidal	5µm	300Å	70m <sup>2</sup> /g	4%	Monomeric	Yes	L1
219MS Di-Phe	Silica	Spheroidal	5µm	300Å	70m <sup>2</sup> /g	4%	Polymeric	Yes	—	

\*Product information is available at [www.discoverysciences.com](http://www.discoverysciences.com). †Proprietary.

# Grace<sup>®</sup> HPLC Hardware Formats

Grace Davison Discovery Sciences provides hardware formats to maximize the performance of the phases in our column families for all applications. Choose a hardware format based on your method requirements for speed, sensitivity, and resolution.

## Ultra High-Pressure Hardware



7135

Ideally suited for ultra high-pressure systems, this ultra-low volume hardware is pressure rated to 18,000psig, and packed with 1.5µm media to maximize speed and efficiency.

Lengths	Inner Diameters	Pressure Limit	Wetted Surfaces
20, 30, 50, 100mm	1.0, 2.0mm	18,000psig	316 Stainless Steel

## Expedite<sup>™</sup> MS Hardware



6113

High-speed, low-volume columns for rapid resolution and high-throughput LC/MS applications.

Lengths	Inner Diameters	Pressure Limit	Wetted Surfaces
10, 20mm	2.1, 4.6mm	10,000psig	316 Stainless Steel

## Rocket<sup>™</sup> Hardware



6904

High-speed, high-resolution columns for high-throughput analysis. Large 7mm i.d. balances column volume with system volume to deliver excellent peak shapes on conventional HPLC instrumentation. Large i.d. also allows fast mobile-phase flow rates which minimizes peak broadening.

Lengths	Inner Diameters	Pressure Limit	Wetted Surfaces
33, 53mm	7mm	10,000psig	316 Stainless Steel

## Solvent-Reducer and Microbore Hardware



7345

Smaller diameter columns reduce solvent consumption and increase sensitivity when compared to standard 4.6mm i.d. columns. Use with standard HPLC instrumentation or with MS and ELS detectors.

Lengths	Inner Diameters	Pressure Limit	Wetted Surfaces
50, 100, 150, 150, 250, 300mm	1.0, 2.1, 3.0mm	10,000psig	316 Stainless Steel

## Capillary Hardware



7344

For LC/MS and other high-sensitivity and sample-limited applications.

Lengths	Inner Diameters	Pressure Limit	Wetted Surfaces
50, 100, 150, 250, 300mm	0.075, 0.150, 0.3, 0.5, 0.8mm	5000psig	316 Stainless Steel and fused silica

## Analytical Hardware



7345

4.6mm i.d. columns for standard HPLC instrumentation, the most commonly used. Analytical columns have industry standard port configurations. Some column families are also available with port configurations for Waters<sup>®</sup> endfittings.

Lengths	Inner Diameters	Pressure Limit	Wetted Surfaces
30, 50, 100, 150, 250, 300mm	4.6mm	10,000psig	316 Stainless Steel

## Metal-Free Hardware



7341

Mechanically strong, metal-free columns offer biocompatibility, and chemical resistance that ion chromatography and biotechnology applications demand.

Lengths	Inner Diameters	Pressure Limit	Wetted Surfaces
50, 100, 150, 250, 300mm	2.1, 4.6mm	5000psig	PEEK

## Capillary Guards



6931

Capillary guards offer zero dead-volume with finger-tight connections to maintain column performance. Use them to protective your capillary investment, as enrichment columns, or as short analytical columns.

Lengths	Inner Diameters	Pressure Limit	Wetted Surfaces
5, 10, 20mm	0.3, 0.5mm	5000psig	316 Stainless Steel and fused silica

## All-Guard<sup>™</sup> Guard Cartridges



6617

Guard system with reusable holder and disposable guard columns to protect analytical columns.

Lengths	Inner Diameters	Pressure Limit	Wetted Surfaces
7.5mm	2.1, 3.0, 4.6mm	5000psig	316 Stainless Steel

## more info

Looking for preparative HPLC hardware? See page 150.



# High Throughput HPLC Introduction

## The Benefits of Grace® Small Particles and Formats

Today's laboratories are under greater demand to analyze more samples in less time. To help meet this demand, major product advances have been made to decrease analysis time and increase HPLC throughput. HPLC system advances have greatly reduced the influence of extra column volumes and have extended the range of flow rates and pressure capabilities. In response to this, Grace now offers a wide range of column chemistries and formats appropriate for all types of high throughput systems.

The use of smaller particles offers two main improvements to the chromatographic separation—increased resolution and speed. Resolution is directly proportional to the square root of column efficiency, therefore the higher the efficiency, the narrower the peaks and the greater the resolution between them. Increased speed comes from higher mobile phase flow rates that can be used without loss in efficiency, and higher flow rates mean faster analysis times.

Understanding the type of system currently in use for high throughput separations and then matching the right column configuration is critical to achieving the best high throughput separation. Here we outline the three types of systems currently in use today for high throughput and the recommended HPLC column format for use with that system.

### tech tip

#### Converting Methods From Traditional Column Formats to High Throughput Columns

Convert Between Standard HPLC and VisionHT™ Columns	
	Flow Rate
Standard HPLC (4.6mm)	1.0X
VisionHT™ (2.0mm)	2.3X

When adjusting between standard LC conditions to VisionHT™ columns convert flow rates accordingly and then increase flow rate for faster analysis.

Convert Between Standard HPLC Columns and Rocket™ Columns	
	Flow Rate
Standard Analytical (4.6mm)	1.0X
Rocket™ Column (7.0mm)	2.3X

Use this conversion of flow rate to transfer methods between Rocket™ column or VisionHT™ columns. Backpressure on standard LC systems should be considered.

## System Type 1 Ultra High-Pressure LC System

(>10,000psig pressure limitation)

**Examples:** Agilent 1200, Waters® Acquity®, Thermo Accela™, Jasco XLc.


### Speed from Ultra High-Pressure Systems:

Representing the latest in LC instrumentation technology, ultra high-pressure systems theoretically have the potential to deliver the fastest separations. They have minimal system volume and offer a pressure limit upwards of 12,000psig. This allows the use of columns with sub 2µm particles and 2–7 times traditional flow rates. Sub 2µm particles extend the working range of acceptable mobile phase linear velocities without sacrificing efficiency. Therefore, you can push flow rates and still get equal or better performance.

### Suggested Column Format:

VisionHT™ columns are designed for microbore and ultra high-pressure LC systems that have small system volumes to limit peak broadening from sample diffusion. VisionHT™ columns are packed with highly efficient 1.5µm phases that yield taller peaks and increase sensitivity. The column hardware incorporates a low dead volume design to minimize sample diffusion, and maintain peak integrity and efficiency. 12,000psig high-pressure stability allows fast flow rates, decreasing run times 10 fold.

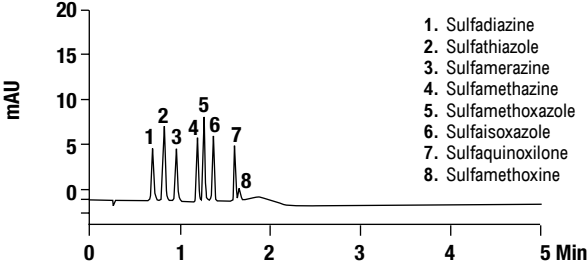
**System Type 1**  
**Recommended Column Format:** VisionHT™  
**Length:** 20, 30, 50, 100mm  
**i.d.:** 1.0 and 2.0mm



7135

**VisionHT™ Columns for  
Ultra High-Pressure LC**

CHROM  
10724



- 1. Sulfadiazine
- 2. Sulfathiazole
- 3. Sulfamerazine
- 4. Sulfamethazine
- 5. Sulfamethoxazole
- 6. Sulfaisoxazole
- 7. Sulfaquinolone
- 8. Sulfamethoxine

**System:** Agilent 1200  
**Mobile Phase:** A: 0.1% Formic Acid  
B: Methanol  
**Detector:** UV at 280nm  
**Temperature:** Ambient

### more info

See pages 34–37 for more information on VisionHT™ columns.

## System Type 2 Low Volume, High Throughput (HTP) LC System

(<10,000psig Pressure Limitation)

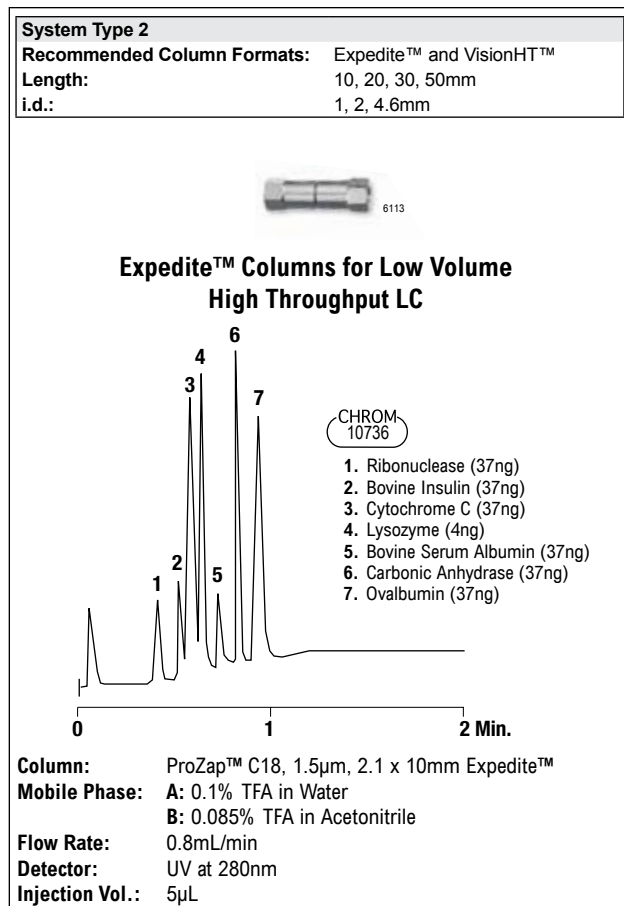
**Examples:** Shimadzu Prominence® UFLC, Hitachi Ultra, LC Packings UltiMate®, Surveyor Plus

### Speed from Low-Volume HTP LC Systems:

These systems concentrate on reducing the cycle time between injections thus allowing more injections per time frame. Typically they employ high-speed gradient pumps, fast autosamplers and a quick detector sampling rates. They are not pressure rated to the extremes of ultra high-pressure systems, but the low system volume allows for short columns of narrow i.d.

### Suggested Column Format:

Expedite™ and VisionHT™ columns are designed for microbore high throughput LC systems that have small system volumes. These formats incorporate a low dead volume design so that sample bands do not diffuse within the column hardware, maintaining peak integrity and efficiency. Expedite™ columns are packed with highly efficient 1.5µm or 3µm in very short column lengths to minimize backpressure and reduce analysis times. Though not as fast as ultra high-pressure LC systems these systems and columns balance both speed and backpressure.



### more info

Expedite™ columns are available in most popular Alltech® brand phases. See page 24–25 for overview of phases and formats offered.

## System Type 3 Traditional LC System

(<5000psi Pressure Limitation)

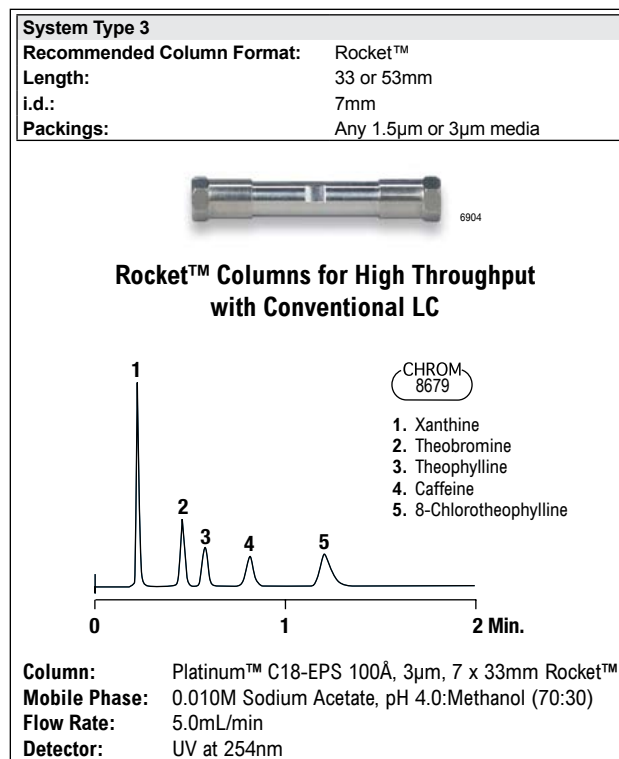
**Examples:** Agilent 1100, Waters® Alliance®, Thermo Surveyor®, Dionex Ultimate®, Shimadzu Prominence®, Hitachi LaChrom®

### Speed from Traditional LC Systems:

To get speed from a traditional LC system, you need to consider the 5000psig pressure limitation, and the typically “large” 2mL system volume. High throughput columns on this system need to deliver a highly efficient separation typically achieved with a small particle packing (≤3µm), but without the high backpressures. The “large” system volume also needs to be balanced with an equally large column volume or the separation will be plagued with extra-column effects.

### Suggested Column Format:

Rocket™ columns provide low backpressure and fast analysis times while preserving column efficiency. They are available with both 1.5µm and 3µm packing materials for use on standard HPLC systems with backpressure limits less than 5000psig. The 7mm i.d. allows faster flow rate that “sweep” the extra system volume faster and reduce peak broadening. This larger diameter also means a larger column volume to system volume ratio to minimize the efficiency loss from extra system volume. This benefit is more pronounced over 2.1 and 1mm i.d. columns that have a smaller ratio than 4.6mm i.d. columns and require much lower flow rates for acceptable backpressures. Low flow rates allow more time for sample diffusion within the standard HPLC’s system volume to further degrade the column’s efficiency.



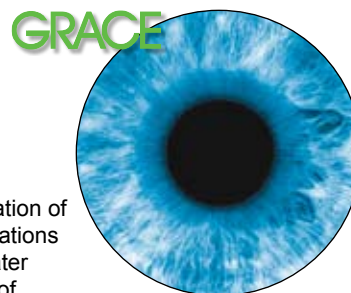
### more info

Rocket™ columns are available in most popular Alltech® brand phases. See page 24–25 for overview of phases and formats offered.

# Grace® VisionHT™ Ultra High-Pressure Columns

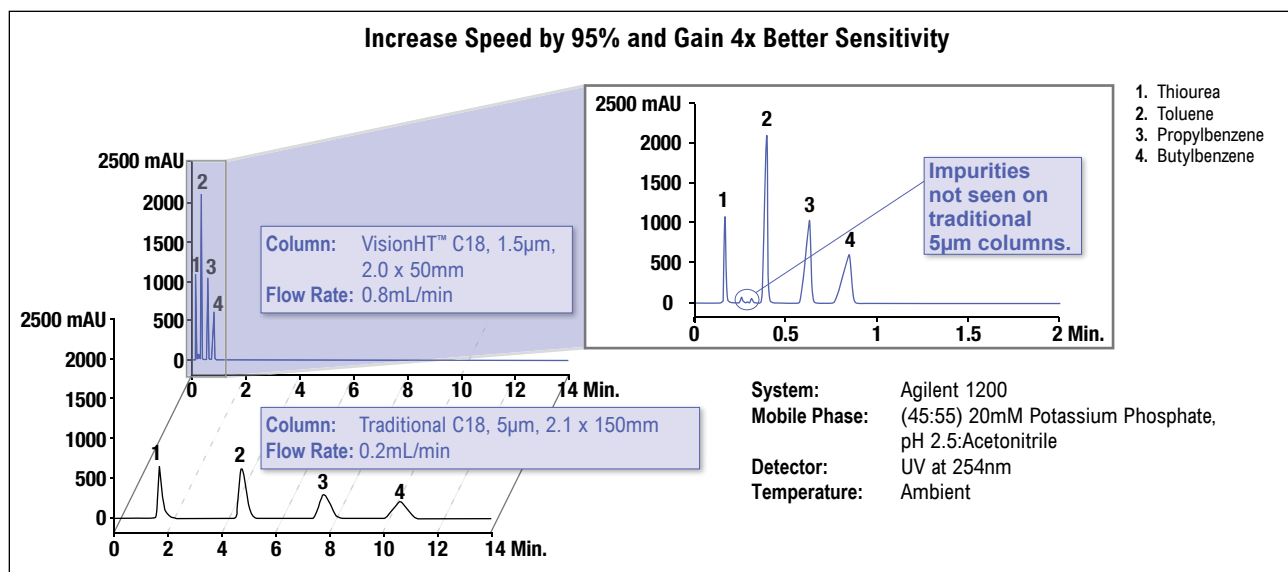
## See Separations with Speed and Clarity

- Ultra-fast separations with superior efficiency, sensitivity, and resolution
- Exceptional stability for long column lifetimes
- Comprehensive sub 2µm stationary phase offering
- 12,000psig pressure rating compatible with all ultra high-pressure LC systems

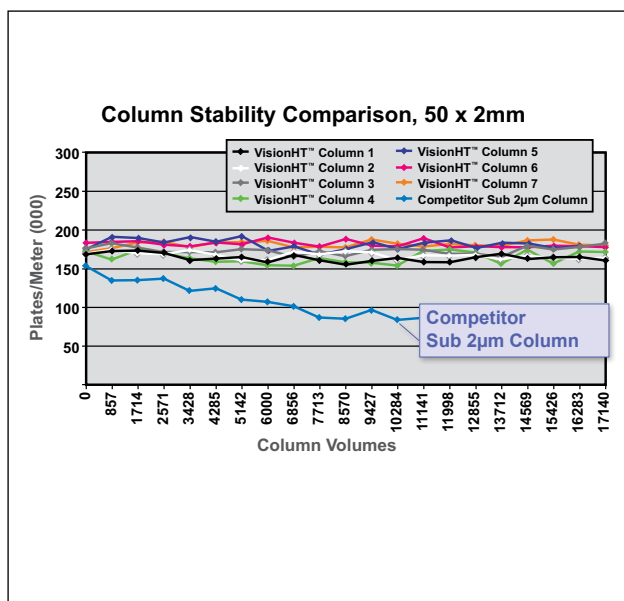


Grace® VisionHT™ columns offer a new level of performance in HPLC. The powerful combination of high-strength 1.5µm media with ultra-low volume hardware, delivers new clarity to your separations and maintains exceptional column lifetime. Complex samples resolve 95% faster with 4x greater sensitivity when compared to traditional 2.1 x 150mm, 5µm columns. And with a wide variety of phases available, the possibilities are endless.

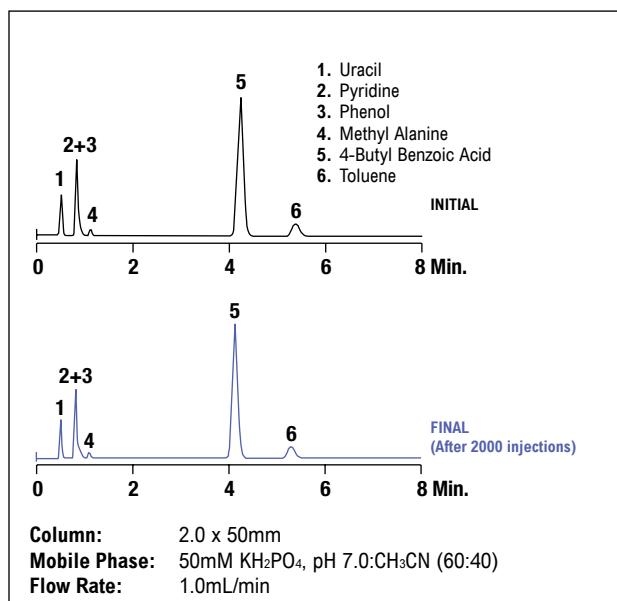
hplc columns | small molecule



## Efficiency and Retention Times Remain Constant after Exposure to 12,000psig and 2000 Injections



High-pressure competitor sub 2µm column lost efficiency at routine 12,000psig pressures. VisionHT™ columns remain stable.



Before and after chromatograms show a constant level of performance after 2000 injections.



# Grace<sup>®</sup> VisionHT<sup>™</sup> Ultra High-Pressure Columns

## Comprehensive High Purity 1.5 $\mu$ m Selectivity Options

Sub 2 $\mu$ m particles deliver efficiency and speed, but critical to success is having the right stationary phase selectivity. Six VisionHT<sup>™</sup> high purity phases are available, each with unique separation benefits. C18-HL, with maximum bonded phase coverage, is ideal for complex hydrophobic samples. Use C18-B for basic compounds at neutral pH, often a requirement for mass spec work in the pharmaceutical industry. Reserve the C18 and C18-P for fastest analysis times. Both offer increased polar interactions to make neutral, non-polar compounds elute faster and retain polar compounds longer. The HILIC and Silica packings are normal phases that typically use near exclusive organic mobile phases; an advantage when seeking highest mass spec sensitivity.

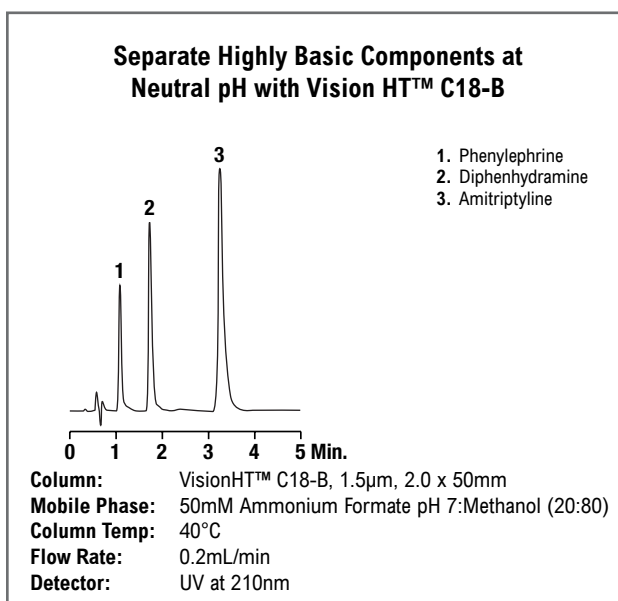
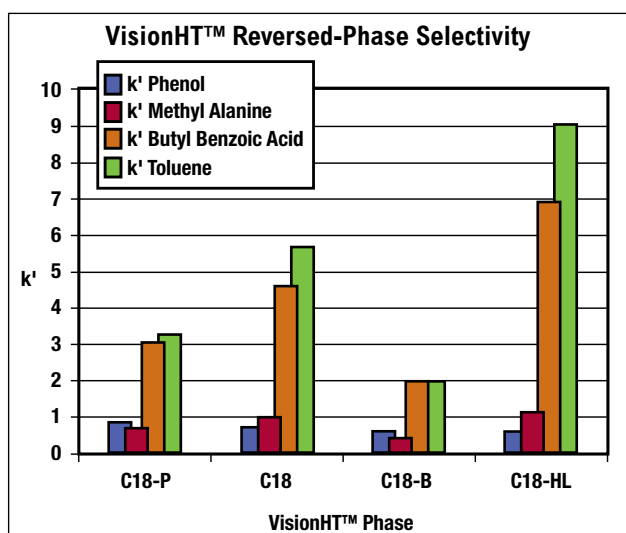
VisionHT<sup>™</sup> phases have exceptionally rigid silica structure that withstands routine use of 12,000psig pressure often required in this new technology. Reproducible silica synthesis, bonding and column packing guarantee low bleed and excellent column-to-column consistency.



7443

VisionHT <sup>™</sup> Phase Specifications									
Packing	Base Material	Particle Size	Carbon Load	Pore Size	Surface Area	Endcapped	pH Range*	Feature	Benefits
C18-HL	Spherical Silica	1.5 $\mu$ m	10%	120Å	220m <sup>2</sup> /g	Yes	1–10	Fully bonded silica, ultra high purity silica	High capacity for hydrophobic compounds. Good peak symmetry.
C18-B	Spherical Silica	1.5 $\mu$ m	5%	120Å	220m <sup>2</sup> /g	Proprietary	1–10	High purity silica and unique endcapping.	Improved performance of basic compounds at neutral pH. Better sensitivity and peak shape by mass spec for basic compounds, without the need for acidified mobile phases.
C18	Spherical Silica	1.5 $\mu$ m	6%	100Å	200m <sup>2</sup> /g	Yes	1–10	Moderate silica exposure	Classic reversed-phase selectivity. Reduced bonding is optimized for speed and sensitivity.
C18-P	Spherical Silica	1.5 $\mu$ m	5%	100Å	200m <sup>2</sup> /g	No	1–10	High silica exposure, low carbon load	Unique polar selectivity. Low carbon load gives fastest reversed-phase elution times while retaining polar compounds longer.
HILIC	Spherical Silica	1.5 $\mu$ m	NA	120Å	220m <sup>2</sup> /g	No	2–8	Polar phase with shorter equilibration times. Shipped in ACN/Water.	Peak reversal compared to reversed-phase. Ideal for very polar compounds with high organic mobile phases for improved sensitivity by MS.
Silica	Spherical Silica	1.5 $\mu$ m	NA	120Å	220m <sup>2</sup> /g	No	2–8	Traditional normal phase for use in 100% organic mobile phases	For isomeric separation of non-aqueous compatible compounds by absorption chromatography.

\*Choice of buffer is critical at pH >8.



### technical assistance

Contact Tech Support: Phone: 1.800.255.8324 (North America)

Email: [contact.alltech@grace.com](mailto:contact.alltech@grace.com)

Online: [www.discoverysciences.com](http://www.discoverysciences.com)



# Grace<sup>®</sup> VisionHT<sup>™</sup> Ultra High-Pressure Columns

## Unique Column Hardware Advantages

You can erode the benefits of sub 2µm media if packed in an inefficient column design. VisionHT<sup>™</sup> hardware uses thin screens, instead of traditional frits, to retain media and minimize dead volume. A unique insert combination seals endfittings leak-free to 18,000psig. Various dimensions offer even more flexibility over analysis speed and resolution.

VisionHT <sup>™</sup> Hardware Specifications	
<b>Dead volume:</b>	<15nL
<b>Wetted materials:</b>	316 Stainless Steel, PTFE
<b>Port Geometry:</b>	10–32, for Industry Standard & Waters <sup>®</sup> connection
<b>Pressure rating, hardware alone:</b>	18,000psig (1250 bar)
<b>Pressure rating, packed column:</b>	12,000psig (830 bar)
<b>i.d.:</b>	1.0, 2.0mm
<b>Length:</b>	20, 30, 50, 100mm



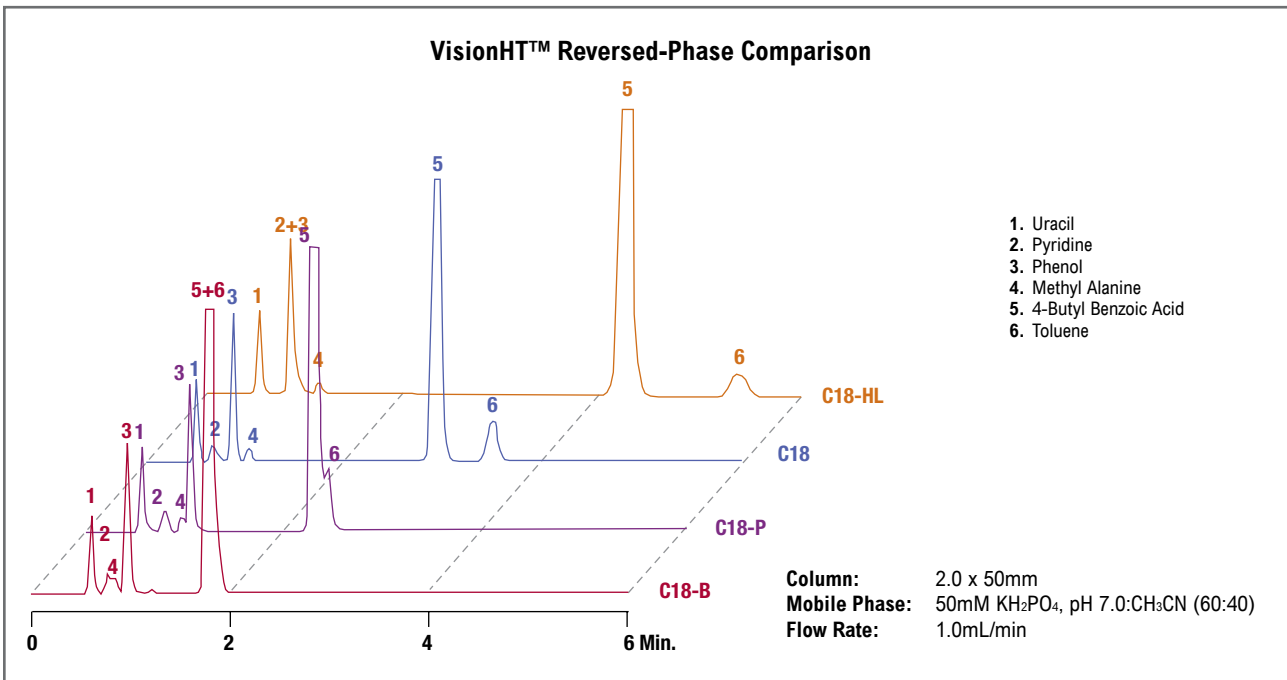
hplc columns | small molecule

## The Best Value for Ultra High-Pressure Method Development—UltraMD Kits!

Whether developing a new method, or improving an existing analysis, the VisionHT<sup>™</sup> UltraMD kits can help optimize your separation. Get four reversed-phase columns with varying selectivity for the price of three, and develop your fast LC method fast!

### VisionHT<sup>™</sup> UltraMD Kits

	Phases	Dimensions	Part No.
<i>UltraMD Kit 1</i>	C18, C18-P, C18-HL, C18-B	2 x 100mm	<b>5142692</b>
<i>UltraMD Kit 2</i>	C18, C18-P, C18-HL, C18-B	2 x 50mm	<b>5142693</b>
<i>UltraMD Kit 3</i>	C18, C18-P, C18-HL, C18-B	1 x 50mm	<b>5142691</b>



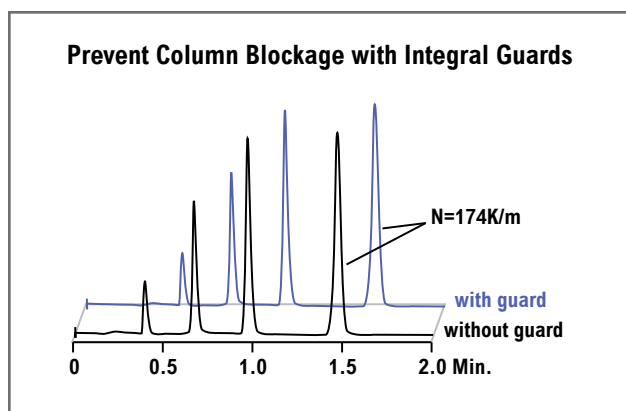


# Grace® VisionHT™ Ultra High-Pressure Columns

## Protect Your UHPLC Column Investment

The smaller diameters and finer porosity frits required in UHPLC creates a higher likelihood of column and system blockage. Trace contaminants not normally problematic for traditional LC, may now pose backpressure issues. VisionHT™ guards protect your column to minimize down time and reduce cost.

Two guard formats available: Integral and stand-alone. Couple the zero-dead volume integral guard directly to any VisionHT™ column, and realize absolutely no loss in efficiency. Use the stand-alone version to protect other manufacturers' UHPLC columns, or as an on-line enrichment device.



No loss in efficiency.

## VisionHT™ Integral Guard System



Replace existing endfitting with the integral guard endfitting. Change guard cartridges as necessary.

## Stand-Alone Guard System



In-line guard system expands applications beyond column protection. Use as a sample enrichment device or to protect any UHPLC commercially available column.

### VisionHT™ Ultra High-Pressure Columns

Packing	Format	i.d. x Length	Part No.	
C18-HL, 1.5µm	Ultra High-Pressure	1 x 20mm	5142540	
	Ultra High-Pressure	1 x 30mm	5142541	
	Ultra High-Pressure	1 x 50mm	5142542	
	Ultra High-Pressure	1 x 100mm	5142543	
	Ultra High-Pressure	2 x 20mm	5142544	
	Ultra High-Pressure	2 x 30mm	5142545	
	Ultra High-Pressure	2 x 50mm	5142546	
	Ultra High-Pressure	2 x 100mm	5142547	
	C18-B, 1.5µm	Ultra High-Pressure	1 x 30mm	5141903
		Ultra High-Pressure	1 x 50mm	5141904
Ultra High-Pressure		1 x 100mm	5141905	
Ultra High-Pressure		1 x 20mm	5141902	
Ultra High-Pressure		2 x 20mm	5141906	
Ultra High-Pressure		2 x 30mm	5141907	
Ultra High-Pressure		2 x 50mm	5141908	
Ultra High-Pressure		2 x 100mm	5141909	
C18, 1.5µm		Ultra High-Pressure	1 x 20mm	5139555
		Ultra High-Pressure	1 x 30mm	5139559
	Ultra High-Pressure	1 x 50mm	5139603	
	Ultra High-Pressure	1 x 100mm	5139607	
	Ultra High-Pressure	2 x 20mm	5139557	
	Ultra High-Pressure	2 x 30mm	5139600	
	Ultra High-Pressure	2 x 50mm	5139605	
	Ultra High-Pressure	2 x 100mm	5139609	
	C18-P, 1.5µm	Ultra High-Pressure	1 x 20mm	5139556
		Ultra High-Pressure	1 x 30mm	5139601
Ultra High-Pressure		1 x 50mm	5139604	
Ultra High-Pressure		1 x 100mm	5139608	
Ultra High-Pressure		2 x 20mm	5139558	
Ultra High-Pressure		2 x 30mm	5139602	
Ultra High-Pressure		2 x 50mm	5139606	
Ultra High-Pressure		2 x 100mm	5139610	
HILIC, 1.5µm		Ultra High-Pressure	1 x 20mm	5141910
		Ultra High-Pressure	1 x 30mm	5141912
	Ultra High-Pressure	1 x 50mm	5141913	
	Ultra High-Pressure	1 x 100mm	5141914	
	Ultra High-Pressure	2 x 20mm	5141916	
	Ultra High-Pressure	2 x 30mm	5141917	
	Ultra High-Pressure	2 x 50mm	5141919	
	Ultra High-Pressure	2 x 100mm	5141920	
	SI, 1.5µm	Ultra High-Pressure	1 x 50mm	5141921
		Ultra High-Pressure	1 x 100mm	5141923
Ultra High-Pressure		2 x 50mm	5141922	
Ultra High-Pressure		2 x 100mm	5141924	

### VisionHT™ Guard Cartridges

Packing	Format	i.d. x Length	Qty.	Part No.
C18HL, 1.5µm	Ultra High-Pressure	1 x 5mm	3/pk	5142549
	Ultra High-Pressure	2 x 5mm	3/pk	5142548
C18 B, 1.5µm	Ultra High-Pressure	1 x 5mm	3/pk	5141953
	Ultra High-Pressure	2 x 5mm	3/pk	5141952
C18, 1.5µm	Ultra High-Pressure	1 x 5mm	3/pk	5141950
	Ultra High-Pressure	2 x 5mm	3/pk	5141594
C18-P, 1.5µm	Ultra High-Pressure	1 x 5mm	3/pk	5141951
	Ultra High-Pressure	2 x 5mm	3/pk	5141595
HILIC, 1.5µm	Ultra High-Pressure	1 x 5mm	3/pk	5141955
	Ultra High-Pressure	2 x 5mm	3/pk	5141954
SI, 1.5µm	Ultra High-Pressure	1 x 5mm	3/pk	5141957
	Ultra High-Pressure	2 x 5mm	3/pk	5141956
Integral Guard Column Holder For VisionHT™				3118351
Stand-Alone Guard Holder				3118350

# Alltech® Alltima™ HP Introduction



## High-Stability, High-Purity, High-Performance, Low-Bleed Columns for Demanding Applications

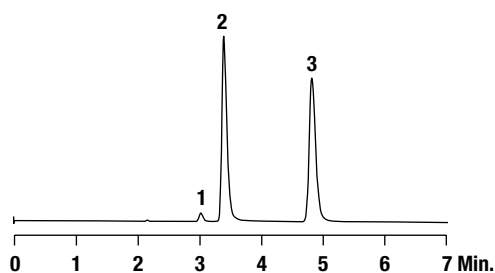
- Better Peak Symmetry—high-purity silica eliminates peak tailing problems
- Long Column Life—exceptional column stability minimizes downtime and reduces cost
- Ideal for Microbore or Critical Analysis—low to no detectable column bleed
- Variety of Phases and Formats—optimizes retention, resolution, and analysis time

Alltima™ HP combines our best phase chemistries with high-purity silica. The result is one product family with selectivity and performance needed to overcome your most challenging separation needs.

### Alltech® Alltima™ HP Phase Specifications

Phase	Description	Base	Particle	Particle Size	Pore Size	Surface Area	Carbon Load	Phase	End-capped?	USP
C18	For classic reversed-phase applications	Silica	Spherical	3, 5µm	190Å	200 m <sup>2</sup> /g	12%	Monomeric	Yes	L1
C18 EPS	Reversed-phase C18 with extended polar selectivity	Silica	Spherical	3, 5µm	190Å	200 m <sup>2</sup> /g	4%	Monomeric	Yes	L1
C18 HiLoad	Higher carbon load for stronger retention	Silica	Spherical	3, 5µm	100Å	450 m <sup>2</sup> /g	24%	Monomeric	Yes	L1
C18 AQ	100% water wettable	Silica	Spherical	3, 5µm	100Å	450 m <sup>2</sup> /g	20%	Monomeric	Yes	L1
C18 Amide	Low bleed polar-embedded phase compatible with microbore	Silica	Spherical	3, 5µm	190Å	200 m <sup>2</sup> /g	12%	Monomeric	Yes	L1
C8	For reversed-phase applications where C18 is too retentive	Silica	Spherical	3, 5µm	190Å	200 m <sup>2</sup> /g	8%	Monomeric	Yes	L7
Cyano	Stable, long-life cyano phase	Silica	Spherical	3, 5µm	190Å	200 m <sup>2</sup> /g	4%	Monomeric	Yes	L10
Silica	For general purpose normal-phase applications	Silica	Spherical	3, 5µm	100Å	450 m <sup>2</sup> /g	—	—	No	L3
HILIC	Hydrophilic Interaction Chromatography for highly polar analytes	Silica	Spherical	1.5, 3, 5µm	120Å	230 m <sup>2</sup> /g	—	—	—	L3

### Basic Compounds at Neutral pH



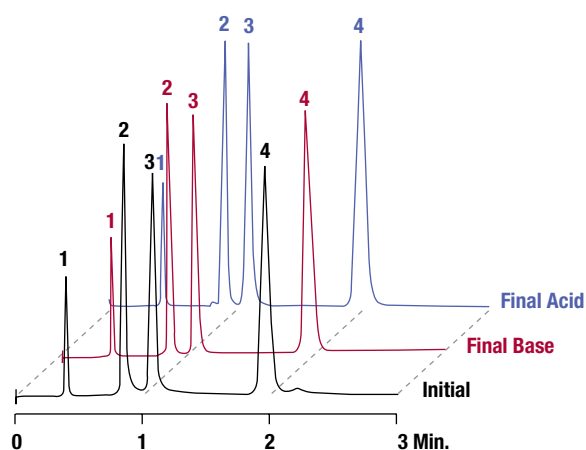
Peak	USP Tailing*
1. Diphenhydramine	1.29
2. Nortriptyline	1.41
3. Amitriptyline	1.27

\*Tailing Factor was determined in accordance with USP method.

**Column:** Alltima™ HP C18, 5µm, 4.6 x 150mm  
**Mobile Phase:** 25mM Potassium Phosphate, pH 7.0:Methanol (15:85)  
**Flow Rate:** 1.0mL/min  
**Detector:** UV at 254nm

The Alltima™ HP phases demonstrate excellent peak symmetry of highly basic analytes at pH 7.0.

### Basic Compound Stability at pH1 and pH10



Retention Times	CHROM 10249	CHROM 10250	CHROM 10252
	1. Uracil	0.56	0.55
2. Phenol	0.82	0.81	0.81
3. N,N-Diethyl-m-Toluamide	1.08	1.08	1.08
4. Toluene	1.89	1.88	1.89

**Column:** Alltima™ HP C18, 5µm, 4.6 x 50mm  
**Mobile Phase:** Acetonitrile:Water (58:42)  
**Flow Rate:** 1.0mL/min  
**Detector:** UV at 254nm

**Final Acid:** washed with 24,000 column volumes of Acetonitrile:Dilute Sulfuric Acid, pH 1.0 (50:50) at 60°C.

**Final Base:** washed with 24,000 column volumes of Acetonitrile:Ammonium Hydroxide, pH 10 (50:50) at 20°C.

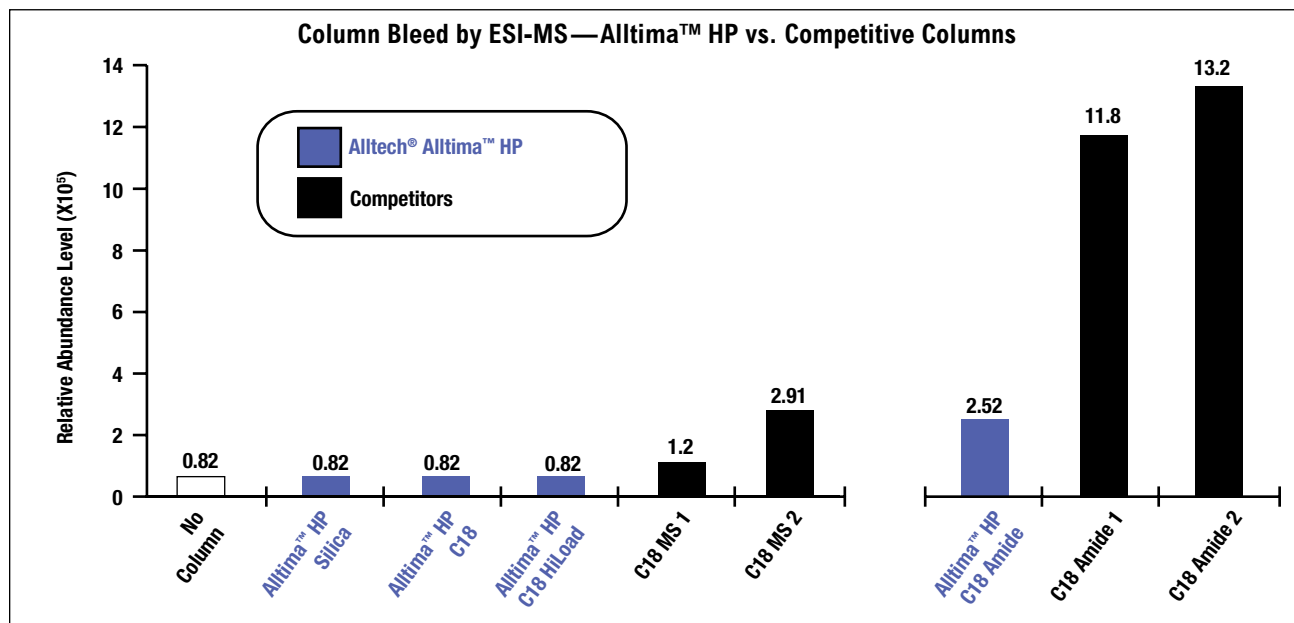
The Alltima™ HP phases demonstrate exceptional stability from pH 1.0 to 10.



# Alltech® Alltima™ HP Introduction

## The Alltima™ HP Family Demonstrates Low Bleed

Alltima™ HP columns are among the lowest-bleed columns available, making them ideal for microbore applications. Our C18 Amide polar-embedded phase has significantly lower column bleed than competitive amide columns.



hplc columns | small molecule

## Alltima™ HP Method Development Kits



### Three Different Kits with Different Selectivities

Whether you are developing a new method, or just not satisfied with an existing separation, the Alltima™ HP family can help optimize your separation. Your best value for method development—purchase a kit and receive three columns for the price of two.



#### Alltima™ HP Method Development Kits

Description	Includes:	i.d. x Length	Part No.
<i>Kit 1—C18 Mix, 3µm</i>			
Expedite™ MS Kit 1	C18, C18 HiLoad, C18 Amide (87674, 87692, 87728)	2.1 x 20mm	<b>87854</b>
Analytical Kit 1	C18, C18 HiLoad, C18 Amide (87668, 87686, 87722)	4.6 x 150mm	<b>87850</b>
Rocket™ Kit 1	C18, C18 HiLoad, C18 Amide (87672, 87690, 87726)	7 x 53mm	<b>87852</b>
<i>Kit 2—Alternate Mix, 3µm</i>			
Expedite™ MS Kit 2	C18 HiLoad, C8, CN (87692, 87746, 87764)	2.1 x 20mm	<b>87864</b>
Analytical Kit 2	C18 HiLoad, C8, CN (87686, 87740, 87760)	4.6 x 150mm	<b>87860</b>
Rocket™ Kit 2	C18 HiLoad, C8, CN (87690, 87744, 87762)	7 x 53mm	<b>87862</b>
<i>Kit 3—Polar Mix, 3µm</i>			
Expedite™ MS Kit 3	C18 EPS, C18 Amide, CN (87710, 87728, 87764)	2.1 x 20mm	<b>87874</b>
Analytical Kit 3	C18 EPS, C18 Amide, CN (87704, 87722, 87758)	4.6 x 150mm	<b>87870</b>
Rocket™ Kit 3	C18 EPS, C18 Amide, CN (87708, 87726, 87762)	7 x 53mm	<b>87872</b>

#### tech tip

Want high throughput on a conventional (non-ultra high-pressure) system?

Choose the Rocket™ column format—no modifications necessary to your existing HPLC system. Choose Expedite™ columns for low volume and microbore systems. See page 31 for more explanation of the Rocket™ and Expedite™ formats.





# Alltech® Alltima™ HP Reversed-Phase Columns

## Selectivity Options in One Product Family

### C18:

- Classic reversed-phase retention and selectivity

### C18 AQ:

- 100% water wettable and high carbon loading for greater mobile phase range

### EPS C18:

- Unique selectivity that succeeds when traditional reversed-phase columns fail
- Greater retention and enhanced peak symmetry for polar compounds

### C18 HiLoad:

- Superior retention and loadability for resolution of complex samples

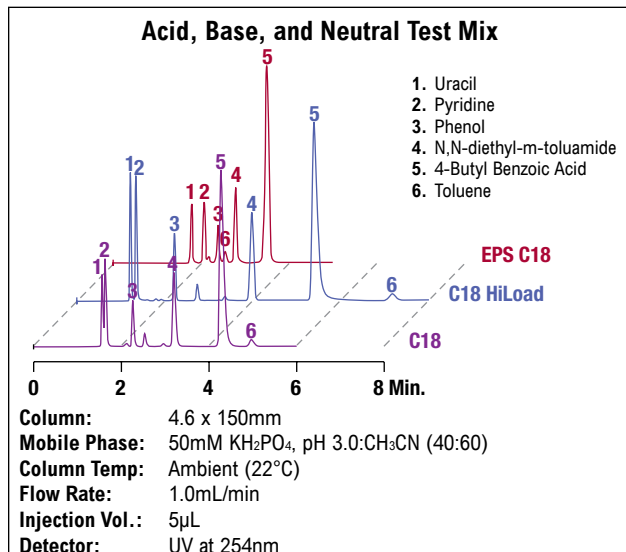
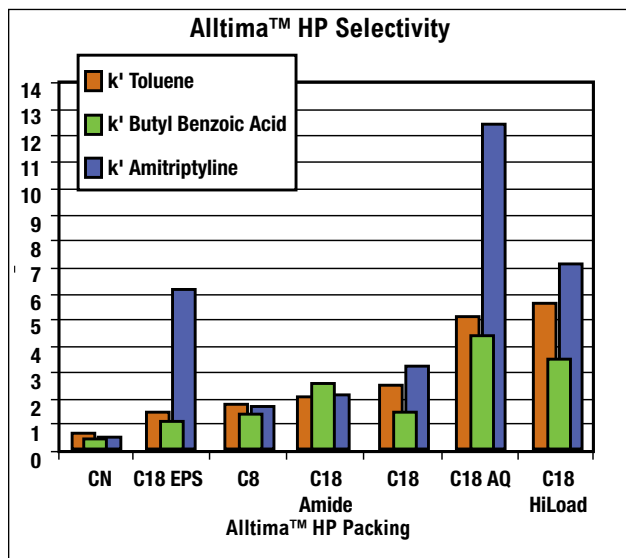
### C18 Amide:

- The first polar-embedded packing ideal for microbore
- Excellent peak shape without phase bleed
- Ideal for basic compounds in neutral to alkaline pH

### C8:

- Less hydrophobic retention than C18

hplc columns | small molecule



### Alltima™ HP HPLC Columns

Packing	Format	i.d. x Length	Part No.		
C18, 3µm*	Capillary	0.150 X 50mm	22153		
	Capillary	0.150 X100mm	22154		
	Capillary	0.150 X150mm	22155		
	Capillary	0.300 X 50mm	22156		
	Capillary	0.300 X100mm	22157		
	Capillary	0.300 X150mm	22158		
	Expedite™ MS	2.1 x 10mm	87673		
	Expedite™ MS	2.1 x 20mm	87674		
	Microbore	2.1 x 50mm	87504		
	Microbore	2.1 x 100mm	87669		
	Microbore	2.1 x 150mm	87670		
	Solvent-Reducer	3.0 x 150mm	87601		
	Expedite™ MS	4.6 x 10mm	87675		
	Expedite™ MS	4.6 x 20mm	87676		
C18 AQ, 3µm*	Analytical	4.6 x 50mm	87826		
	Analytical	4.6 x 100mm	87667		
	Analytical	4.6 x 150mm	87668		
	Rocket™	7 x 33mm	87671		
	Rocket™	7 x 53mm	87672		
	C18 AQ, 5µm	Microbore	2.1 x 150mm	87681	
		Microbore	2.1 x 250mm	87682	
		Solvent-Reducer	3.0 x 150mm	87602	
		Solvent-Reducer	3.0 x 250mm	87603	
		Analytical	4.6 x 150mm	87679	
		Analytical	4.6 x 250mm	87680	
		C18 AQ, 3µm*	Capillary	0.150 x 50mm	22560
			Capillary	0.150 x 100mm	22561
			Capillary	0.150 x 150mm	22562
Capillary			0.300 x 50mm	22563	
Capillary			0.300 x 100mm	22564	
Capillary			0.300 x 150mm	22565	
Expedite™ MS			2.1 x 10mm	87813	
Expedite™ MS			2.1 x 20mm	87814	
Microbore	2.1 x 100mm		87809		
Microbore	2.1 x 150mm		87810		
Expedite™ MS	4.6 x 10mm		87815		
Expedite™ MS	4.6 x 20mm		87816		
Analytical	4.6 x 50mm		87832		
Analytical	4.6 x 100mm		87807		
Analytical	4.6 x 150mm	87808			
Rocket™	7 x 33mm	87811			
Rocket™	7 x 53mm	87812			
C18 AQ, 5µm	Microbore	2.1 x 150mm	87821		
	Microbore	2.1 x 250mm	87822		
	Analytical	4.6 x 150mm	87819		
	Analytical	4.6 x 250mm	87820		
	C18 EPS, 3µm	Expedite™ MS	2.1 x 10mm	87709	
		Expedite™ MS	2.1 x 20mm	87710	
Microbore		2.1 x 50mm	87508		
Microbore		2.1 x 100mm	87705		
Microbore		2.1 x 150mm	87706		
Solvent-Reducer		3.0 x 150mm	87604		
Expedite™ MS		4.6 x 10mm	87711		
Expedite™ MS		4.6 x 20mm	87712		
Analytical		4.6 x 50mm	87833		
Analytical		4.6 x 100mm	87703		
Analytical		4.6 x 150mm	87704		
Rocket™		7 x 33mm	87707		
Rocket™		7 x 53mm	87708		
C18 EPS, 5µm		Microbore	2.1 x 150mm	87717	
	Microbore	2.1 x 250mm	87718		
	Solvent-Reducer	3.0 x 150mm	87605		
	Solvent-Reducer	3.0 x 250mm	87606		
	Analytical	4.6 x 150mm	87715		
	Analytical	4.6 x 250mm	87716		

\*Other particle sizes and dimensions are available.



# Alltech® Alltima™ HP Reversed-Phase Columns

## Alltima™ HP HPLC Columns (continued)

Packing	Format	i.d. x Length	Part No.	
C18 Hi-Load, 3µm*	Capillary	0.150 x 50mm	<b>22190</b>	
	Capillary	0.300 x 50mm	<b>22193</b>	
	Expedite™ MS	2.1 x 10mm	<b>87691</b>	
	Expedite™ MS	2.1 x 20mm	<b>87692</b>	
	Microbore	2.1 x 50mm	<b>87506</b>	
	Microbore	2.1 x 100mm	<b>87687</b>	
	Microbore	2.1 x 150mm	<b>87688</b>	
	Solvent-Reducer	3.0 x 150mm	<b>87610</b>	
	Expedite™ MS	4.6 x 10mm	<b>87693</b>	
	Expedite™ MS	4.6 x 20mm	<b>87694</b>	
	Analytical	4.6 x 50mm	<b>87827</b>	
	Analytical	4.6 x 100mm	<b>87685</b>	
	Analytical	4.6 x 150mm	<b>87686</b>	
	Rocket™	7 x 33mm	<b>87689</b>	
	Rocket™	7 x 53mm	<b>87690</b>	
	C18 Hi-Load, 5µm	Microbore	2.1 x 150mm	<b>87699</b>
		Microbore	2.1 x 250mm	<b>87700</b>
Solvent-Reducer		3.0 x 150mm	<b>87611</b>	
Solvent-Reducer		3.0 x 250mm	<b>87612</b>	
Analytical		4.6 x 150mm	<b>87697</b>	
Analytical		4.6 x 250mm	<b>87698</b>	
C18 Amide, 3µm*	Capillary	0.150 x 50mm	<b>22255</b>	
	Capillary	0.300 x 50mm	<b>22258</b>	
	Expedite™ MS	2.1 x 10mm	<b>87727</b>	
	Expedite™ MS	2.1 x 20mm	<b>87728</b>	
	Microbore	2.1 x 50mm	<b>87510</b>	
	Microbore	2.1 x 100mm	<b>87723</b>	
	Microbore	2.1 x 150mm	<b>87724</b>	
	Solvent-Reducer	3.0 x 150mm	<b>87607</b>	
	Expedite™ MS	4.6 x 10mm	<b>87729</b>	
	Expedite™ MS	4.6 x 20mm	<b>87730</b>	
	Analytical	4.6 x 50mm	<b>87829</b>	
	Analytical	4.6 x 100mm	<b>87721</b>	
	Analytical	4.6 x 150mm	<b>87722</b>	
	Rocket™	7 x 33mm	<b>87725</b>	
	Rocket™	7 x 53mm	<b>87726</b>	
	C18 Amide, 5µm	Microbore	2.1 x 150mm	<b>87735</b>
		Microbore	2.1 x 250mm	<b>87736</b>
Solvent-Reducer		3.0 x 150mm	<b>87608</b>	
Solvent-Reducer		3.0 x 250mm	<b>87609</b>	
Analytical		4.6 x 150mm	<b>87733</b>	
Analytical		4.6 x 250mm	<b>87734</b>	
C8, 3µm*	Capillary	0.150 x 50mm	<b>22479</b>	
	Capillary	0.150 x 100mm	<b>22480</b>	
	Capillary	0.150 x 150mm	<b>22481</b>	
	Capillary	0.300 x 50mm	<b>22482</b>	
	Capillary	0.300 x 100mm	<b>22483</b>	
	Capillary	0.300 x 150mm	<b>22484</b>	
	Expedite™ MS	2.1 x 10mm	<b>87745</b>	
	Expedite™ MS	2.1 x 20mm	<b>87746</b>	
	Microbore	2.1 x 50mm	<b>87512</b>	
	Microbore	2.1 x 100mm	<b>87741</b>	
	Microbore	2.1 x 150mm	<b>87742</b>	
	Solvent-Reducer	3.0 x 150mm	<b>87613</b>	
	Expedite™ MS	4.6 x 10mm	<b>87747</b>	
	Expedite™ MS	4.6 x 20mm	<b>87748</b>	
	Analytical	4.6 x 50mm	<b>87830</b>	
	Analytical	4.6 x 100mm	<b>87739</b>	
	Analytical	4.6 x 150mm	<b>87740</b>	
	Rocket™	7 x 33mm	<b>87743</b>	
	Rocket™	7 x 53mm	<b>87744</b>	
	C8, 5µm	Microbore	2.1 x 150mm	<b>87753</b>
		Microbore	2.1 x 250mm	<b>87754</b>
		Solvent-Reducer	3.0 x 150mm	<b>87614</b>
		Solvent-Reducer	3.0 x 250mm	<b>87615</b>
Analytical		4.6 x 150mm	<b>87751</b>	
Analytical		4.6 x 250mm	<b>87752</b>	

\*Other particle sizes and dimensions are also available.

## Alltima™ HP-Guard Cartridges

Packing	i.d. x Length	Qty.	Part No.
C18 Capillary Guard, 3µm**	0.150 x 10mm	ea	<b>22578</b>
	0.300 x 10mm	ea	<b>22579</b>
C18 All-Guard™, 5µm*	2.1 x 7.5mm	3	<b>87683</b>
	3.0 x 7.5mm	3	<b>87622</b>
	4.6 x 7.5mm	3	<b>87684</b>
C18 AQ Capillary Guard, 3µm**	0.150 x 10mm	ea	<b>22638</b>
	0.300 x 10mm	ea	<b>22639</b>
C18 AQ All-Guard™, 5µm*	2.1 x 7.5mm	3	<b>87823</b>
	4.6 x 7.5mm	3	<b>87824</b>
C18 EPS All-Guard™, 5µm*	2.1 x 7.5mm	3	<b>87719</b>
	3.0 x 7.5mm	3	<b>87623</b>
	4.6 x 7.5mm	3	<b>87720</b>
C18 Hi-Load Capillary Guard, 3µm**	0.150 x 10mm	ea	<b>22588</b>
	0.300 x 10mm	ea	<b>22589</b>
C18 Hi-Load All-Guard™, 5µm*	2.1 x 7.5mm	3	<b>87701</b>
	3.0 x 7.5mm	3	<b>87624</b>
	4.6 x 7.5mm	3	<b>87702</b>
C18 Amide Capillary Guard, 3µm**	0.150 x 10mm	ea	<b>22598</b>
	0.300 x 10mm	ea	<b>22599</b>
C18 Amide All-Guard™, 5µm*	2.1 x 7.5mm	3	<b>87737</b>
	3.0 x 7.5mm	3	<b>87625</b>
	4.6 x 7.5mm	3	<b>87738</b>
C8 Capillary Guard, 3µm**	0.150 x 10mm	ea	<b>22648</b>
	0.300 x 10mm	ea	<b>22648</b>
C8 All-Guard™, 5µm*	2.1 x 7.5mm	3	<b>87755</b>
	3.0 x 7.5mm	3	<b>87627</b>
	4.6 x 7.5mm	3	<b>87756</b>
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	<b>80101</b>
Capillary Guard Cartridge Holder			
Guard Holder for 0.100mm and 0.150mm Guards		ea	<b>GR-3710E</b>
Guard Holder for 0.300mm and 0.500mm Guards		ea	<b>GR-3710A</b>

\*All-Guard™ holder required.

\*\*Other particle sizes and dimensions are available.

### tech tip

#### Which guard format should I choose?

Ideally, the guard should have the same or slightly smaller i.d. as the HPLC column. Efficiency will suffer, if the guard i.d. is larger than that of the column.

### technical assistance

Contact Tech Support: Phone: 1.800.255.8324 (North America)  
Email: [contact.alltech@grace.com](mailto:contact.alltech@grace.com)  
Online: [www.discoverysciences.com](http://www.discoverysciences.com)

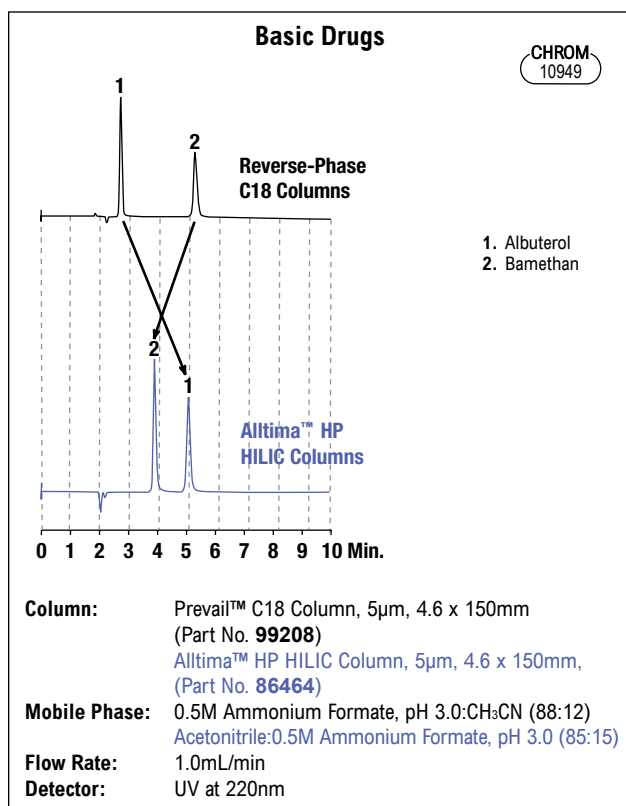


# Alltech® Alltima™ HP HILIC Columns

## Hydrophilic Interaction (HILIC) Columns for Highly Polar Basic Analytes

- Superior retention of highly polar compounds
- Increased sensitivity and lower detection limits with microbore
- Available in 1.5µm particle size

Hydrophilic Interaction Chromatography is ideal for separating and retaining very polar compounds that may not retain on traditional reversed-phase packings. Unlike reversed-phase columns, HILIC columns retain highly polar compounds with only small amounts of water in the mobile phase. These more volatile mobile phases increase sensitivity with microbore applications.



Use Alltima™ HP HILIC's alternate selectivity for greater separation possibilities.

### tech tip

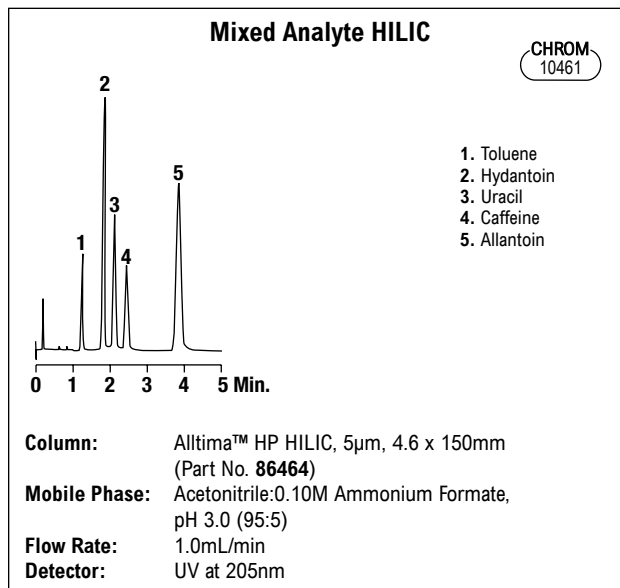
Want high throughput on a conventional (non-ultra high-pressure) system?

Choose the Rocket™ column format—no modifications necessary to your existing HPLC system. Choose Expedite™ columns for low volume and microbore systems. See page 31 for more explanation of the Rocket™ and Expedite™ formats.

Rocket™ Columns



Expedite™ Columns



Alternate selectivity compared to reversed-phase columns allows more separation possibilities.

### Alltima™ HP HILIC HPLC Columns

Packing	Format	i.d. x Length	Part No.
HILIC, 1.5µm	Expedite™ MS	2.1 x 20mm	86471
	Expedite™ MS	4.6 x 20mm	86472
	Rocket™	7 x 33mm	86467
HILIC, 3µm*	Rocket™	7 x 53mm	86468
	Capillary	0.150 x 50mm	22515
	Capillary	0.150 x 100mm	22516
	Capillary	0.150 x 150mm	22517
	Capillary	0.300 x 50mm	22518
	Capillary	0.300 x 100mm	22519
	Capillary	0.300 x 150mm	22520
	Expedite™ MS	2.1 x 10mm	86473
	Expedite™ MS	2.1 x 20mm	86475
	Microbore	2.1 x 50mm	86461
Microbore	2.1 x 150mm	86463	
Expedite™ MS	4.6 x 10mm	86474	
Expedite™ MS	4.6 x 20mm	86476	
Analytical	4.6 x 50mm	86460	
Analytical	4.6 x 150mm	86462	
Rocket™	7 x 33mm	86469	
Rocket™	7 x 53mm	86470	
HILIC, 5µm	Microbore	2.1 x 150mm	86465
	Analytical	4.6 x 150mm	86464
	Analytical	4.6 x 250mm	86466

\*Other particle sizes and dimensions are available.

### Alltima™ HP HILIC Guard Cartridges

Packing	i.d. x Length	Qty.	Part No.
HILIC Capillary Guard,	0.150 x 10mm	ea	22658
3µm**	0.300 x 10mm	ea	22659
HILIC All-Guard™, 5µm*	2.1 x 7.5mm	3	86479
	4.6 x 7.5mm	3	86480
All-Guard™ Cartridge Holder (Includes Direct-Connect™ Column Coupler)		ea	80101
Capillary Guard Cartridge Holder			
Guard Holder for 0.100mm and 0.150mm Guards		ea	GR-3710E
Guard Holder for 0.300mm and 0.500mm Guards		ea	GR-3710A

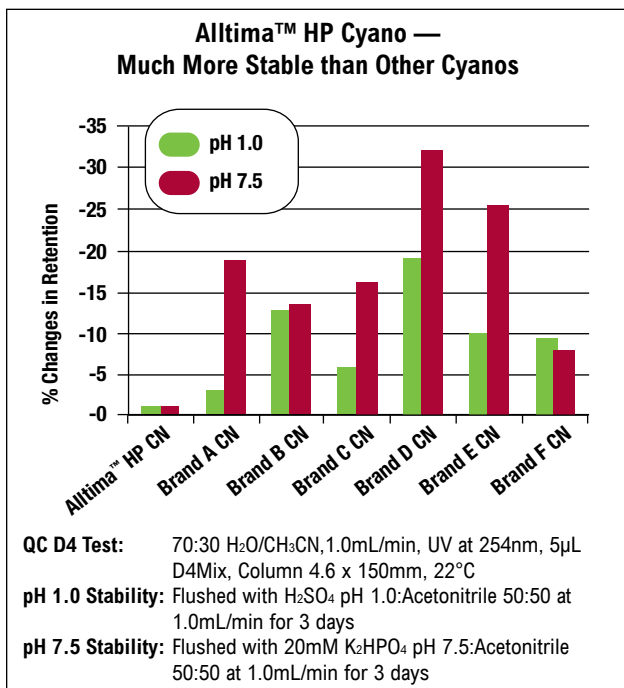
\*All-Guard™ holder required.

\*\*Other particle sizes and dimensions are available.



# Alltech® Alltima™ HP Normal-Phase Columns

- Cyano:**
- Superior stability
  - More reproducible separations than silica for normal-phase applications
  - Ideal for basic drug analysis
- Silica:**
- Normal phase

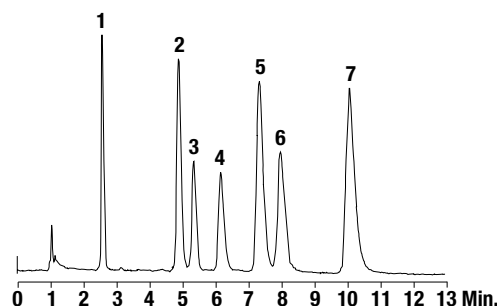


## Alltima™ HP HPLC Columns

Packing	Format	i.d. x Length	Part No.
Cyano, 3µm	Expedite™ MS	2.1 x 10mm	87763
	Expedite™ MS	2.1 x 20mm	87764
	Microbore	2.1 x 50mm	87514
	Microbore	2.1 x 100mm	87759
	Microbore	2.1 x 150mm	87760
	Solvent-Reducer	3.0 x 150mm	87616
	Expedite™ MS	4.6 x 10mm	87765
	Expedite™ MS	4.6 x 20mm	87766
	Analytical	4.6 x 50mm	87825
	Analytical	4.6 x 100mm	87757
	Analytical	4.6 x 150mm	87758
	Rocket™	7 x 33mm	87761
	Rocket™	7 x 53mm	87762
	Cyano, 5µm	Microbore	2.1 x 150mm
Microbore		2.1 x 250mm	87782
Solvent-Reducer		3.0 x 150mm	87617
Solvent-Reducer		3.0 x 250mm	87618
Analytical		4.6 x 150mm	87769
Analytical		4.6 x 250mm	87780
Silica, 3µm	Expedite™ MS	2.1 x 10mm	87791
	Expedite™ MS	2.1 x 20mm	87792
	Microbore	2.1 x 50mm	87516
	Microbore	2.1 x 100mm	87787
	Microbore	2.1 x 150mm	87788
	Solvent-Reducer	3.0 x 150mm	87619
	Expedite™ MS	4.6 x 10mm	87793
	Expedite™ MS	4.6 x 20mm	87794
	Analytical	4.6 x 50mm	87831
	Analytical	4.6 x 100mm	87785
	Analytical	4.6 x 150mm	87786
	Rocket™	7 x 33mm	87789
	Rocket™	7 x 53mm	87790

## Corticosteroids

1. Deoxycorticosterone Acetate
2. Hydrocortisone Acetate
3. Cortisone Acetate
4. Cortisone
5. Prednisone
6. Hydrocortisone
7. Prednisolone

CHROM  
10391

**Column:** Alltima™ HP CN, 5µm, 4.6 x 150mm (Part No. 87769)

**Mobile Phase:** Hexane:Isopropanol (93.7:6.3)

**Flow Rate:** 2.0mL/min

**Column Temp:** 35°C

**Detector:** UV at 254nm

## Alltima™ HP HPLC Columns (continued)

Packing	Format	i.d. x Length	Part No.
Silica, 5µm	Microbore	2.1 x 150mm	87799
	Microbore	2.1 x 250mm	87802
	Solvent-Reducer	3.0 x 150mm	87620
	Solvent-Reducer	3.0 x 250mm	87621
	Analytical	4.6 x 150mm	87797
	Analytical	4.6 x 250mm	87798

## Alltima™ HP All-Guard™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
Cyano, 5µm	2.1 x 7.5mm	3	87783
	3.0 x 7.5mm	3	87626
	4.6 x 7.5mm	3	87784
Silica, 5µm	2.1 x 7.5mm	3	87803
	3.0 x 7.5mm	3	87628
	4.6 x 7.5mm	3	87804

All-Guard™ Cartridge Holder  
(Includes Direct-Connect Column Coupler)

\*All-Guard™ holder required. Other particle sizes available.

## more applications

To view our complete searchable chromatogram database visit [www.discoverysciences.com/chromdb/](http://www.discoverysciences.com/chromdb/)



# Alltech® Prevail™ Introduction

Alltech



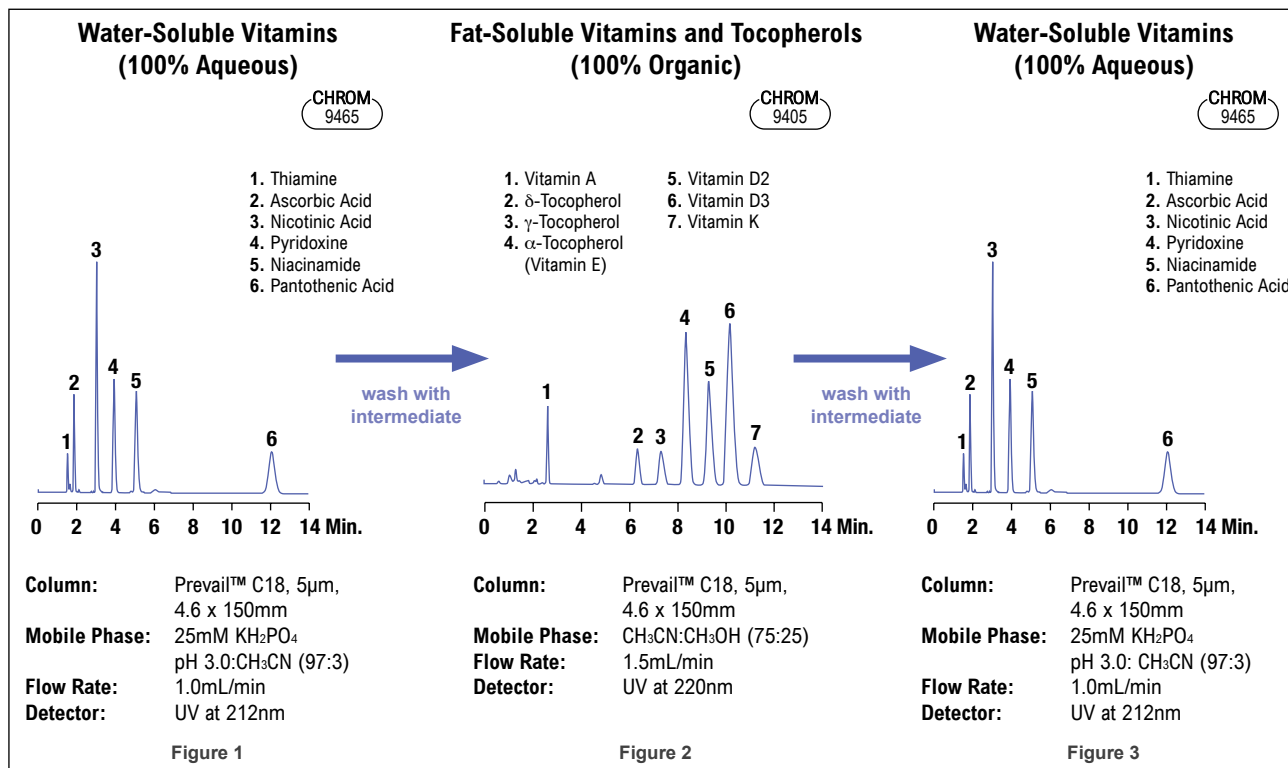
## Stable from 100% Organic to 100% Aqueous

- Long column life in both highly aqueous and highly organic mobile phases
- Excellent retention and reproducibility of highly polar analytes in 100% aqueous mobile phases
- Strong retention of hydrophobic analytes in 100% organic mobile phases, no concerns of solubility, better sensitivity in microbore and ELSD applications
- No phase collapse
- Specialty phases for specific applications

With one **Prevail™ C18** column, retain polar compounds in aqueous mobile phases and hydrophobic compounds in organic mobile phases.

Alltech® Prevail™ Phase Specifications									
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
C18 Select	Silica	Spherical	3, 5µm	110Å	350m <sup>2</sup> /g	17%	Monomeric	Yes	L1
C18	Silica	Spherical	3, 5µm	110Å	350m <sup>2</sup> /g	15%	Monomeric	Yes	L1
C8	Silica	Spherical	3, 5µm	110Å	350m <sup>2</sup> /g	8%	Monomeric	Yes	L7
Phenyl	Silica	Spherical	3, 5µm	110Å	350m <sup>2</sup> /g	7%	Monomeric	Yes	L11
Cyano	Silica	Spherical	3, 5µm	110Å	350m <sup>2</sup> /g	—	Monomeric	Yes	L10
Amino (NH <sub>2</sub> )	Silica	Spherical	3, 5µm	110Å	350m <sup>2</sup> /g	—	Monomeric	No	L8
Silica	Silica	Spherical	3, 5µm	110Å	350m <sup>2</sup> /g	—	—	—	L3
Organic Acid	Silica	Spherical	3, 5µm	110Å	350m <sup>2</sup> /g	—	Monomeric	Yes	—
Carbohydrate ES	Polymer	Spherical	5µm	—	—	—	—	—	—

## Switch Between 100% Aqueous and 100% Organic Mobile Phases on the Same Column



Prevail™ Columns have highly stable bonded phases that let you use one column for multiple mobile phase conditions. Even switching between extremes such as near 100% aqueous (Figure 1) to 100% organic conditions (Figure 2), and back to near 100% aqueous (Figure 3) on a routine basis is possible, provided that mobile phases are miscible.



# Alltech® Prevail™ Reversed-Phase Columns

## Prevail™ HPLC Columns

Packing	Format	i.d. x Length	Part No.
Select C18, 3µm	Microbore	2.1 x 50mm	99309
	Microbore	2.1 x 100mm	99312
	Microbore	2.1 x 150mm	99313
	Solvent-Reducer	3.0 x 150mm	99315
	Analytical	4.6 x 100mm	99302
	Analytical	4.6 x 150mm	99303
	Rocket™	7 x 33mm	99304
	Rocket™	7 x 53mm	99305
Select C18, 5µm	Microbore	2.1 x 150mm	99310
	Microbore	2.1 x 250mm	99311
	Solvent-Reducer	3.0 x 150mm	99316
	Solvent-Reducer	3.0 x 250mm	99317
	Analytical	4.6 x 150mm	99300
C18, 3µm	Analytical	4.6 x 250mm	99301
	Microbore	150µm x 50mm	35762
C18, 3µm	Microbore	150µm x 150mm	35764
	Microbore	300µm x 50mm	32831
	Microbore	300µm x 150mm	32832
	Microbore	1.0 x 100mm	43831
	Microbore	1.0 x 150mm	43843
	Expedite™ MS	2.1 x 10mm	43861
	Expedite™ MS	2.1 x 20mm	43827
	Microbore	2.1 x 50mm	43818
	Microbore	2.1 x 100mm	43871
	Microbore	2.1 x 150mm	99200
	Solvent-Reducer	3.0 x 150mm	99322
	Expedite™ MS	4.6 x 10mm	43878
	Expedite™ MS	4.6 x 20mm	43804
	Analytical	4.6 x 50mm	43829
	Analytical	4.6 x 100mm	99202
	Analytical	4.6 x 150mm	99204
	Rocket™	7 x 33mm	99280
	Rocket™	7 x 53mm	99279

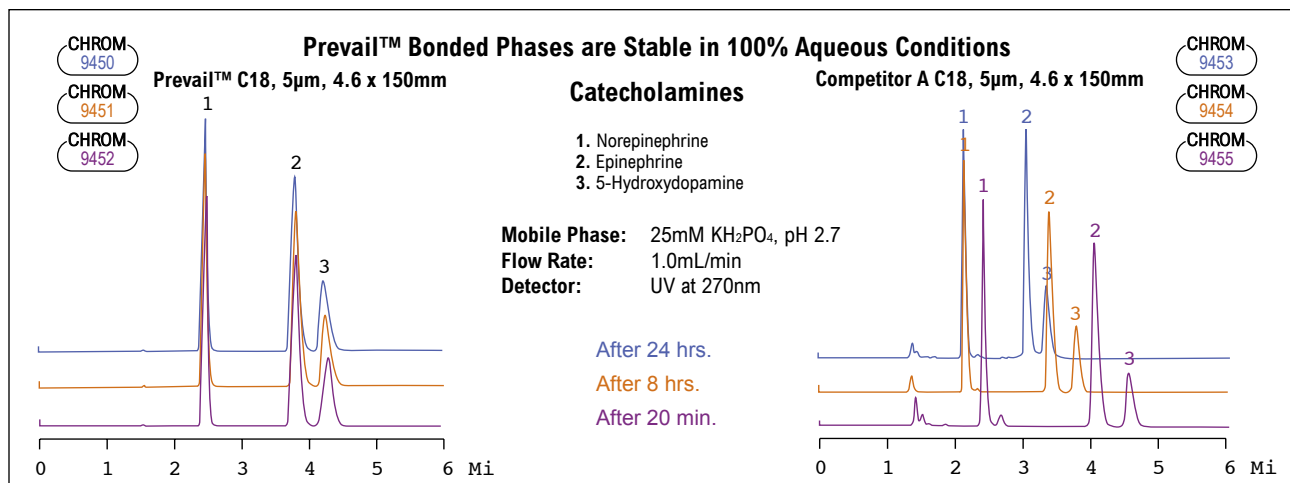
## Prevail™ HPLC Columns (continued)

Packing	Format	i.d. x Length	Part No.	
C18, 5µm	Microbore	150µm x 50mm	35792	
	Microbore	150µm x 150mm	35794	
	Microbore	300µm x 50mm	32815	
	Microbore	300µm x 150mm	32816	
	Microbore	2.1 x 150mm	99206	
	Solvent-Reducer	3.0 x 150mm	99320	
	Solvent-Reducer	3.0 x 250mm	99321	
	Analytical	4.6 x 50mm	43903	
	Analytical	4.6 x 150mm	99208	
	Analytical	4.6 x 250mm	99210	
	C8, 3µm	Microbore	2.1 x 150mm	99212
		Solvent-Reducer	3.0 x 150mm	99325
Analytical		4.6 x 50mm	43922	
Analytical		4.6 x 100mm	99214	
Analytical		4.6 x 150mm	99216	
C8, 5µm		Microbore	2.1 x 150mm	99218
	Solvent-Reducer	3.0 x 150mm	99323	
	Solvent-Reducer	3.0 x 250mm	99324	
	Analytical	4.6 x 150mm	99224	
	Analytical	4.6 x 250mm	99229	
	Phenyl, 3µm	Microbore	1.0 x 100mm	43893
		Microbore	1.0 x 150mm	43859
		Expedite™ MS	2.1 x 10mm	43873
		Expedite™ MS	2.1 x 20mm	43885
		Microbore	2.1 x 50mm	43819
		Microbore	2.1 x 100mm	43872
		Microbore	2.1 x 150mm	99231
Solvent-Reducer		3.0 x 150mm	99328	
Expedite™ MS		4.6 x 10mm	43887	
Expedite™ MS		4.6 x 20mm	43815	
Analytical		4.6 x 50mm	43869	
Analytical		4.6 x 100mm	99233	
Analytical	4.6 x 150mm	99235		
Rocket™	7 x 33mm	99282		
Rocket™	7 x 53mm	99281		
Phenyl, 5µm	Microbore	2.1 x 150mm	99237	
	Solvent-Reducer	3.0 x 150mm	99326	
	Solvent-Reducer	3.0 x 250mm	99327	
	Analytical	4.6 x 150mm	99239	
	Analytical	4.6 x 250mm	99241	

### tech tip

Want high throughput on a conventional (non-ultra high-pressure) system?

Choose the Rocket™ column format—no modifications necessary to your existing HPLC system. Choose Expedite™ columns for low volume and microbore systems. See page 31 for more explanation of the Rocket™ and Expedite™ formats.





# Alltech® Prevail™ Normal-Phase Columns

## Prevail™ HPLC Columns

Packing	Format	i.d. x Length	Part No.
Cyano, 3µm	Microbore	2.1 x 150mm	99243
	Solvent-Reducer	3.0 x 150mm	99338
	Analytical	4.6 x 50mm	43924
	Analytical	4.6 x 100mm	99245
	Analytical	4.6 x 150mm	99247
Cyano, 5µm	Microbore	2.1 x 150mm	99249
	Solvent-Reducer	3.0 x 150mm	99329
	Solvent-Reducer	3.0 x 250mm	99330
	Analytical	4.6 x 150mm	99251
	Analytical	4.6 x 250mm	99253
Amino, 3µm	Analytical	4.6 x 50mm	43926
	Analytical	4.6 x 100mm	99257
	Analytical	4.6 x 150mm	99259
Amino, 5µm	Analytical	4.6 x 150mm	99263
	Analytical	4.6 x 250mm	99265
Silica, 3µm	Microbore	1.0 x 100mm	43832
	Microbore	1.0 x 150mm	43806
	Expedite™ MS	2.1 x 10mm	43841
	Expedite™ MS	2.1 x 20mm	43826
	Microbore	2.1 x 50mm	43868
	Microbore	2.1 x 100mm	43805
	Microbore	2.1 x 150mm	99267
	Solvent-Reducer	3.0 x 150mm	99341
	Expedite™ MS	4.6 x 10mm	43858
	Expedite™ MS	4.6 x 20mm	43816
	Analytical	4.6 x 50mm	43842
	Analytical	4.6 x 100mm	99269
	Analytical	4.6 x 150mm	99271
	Rocket™	7 x 33mm	99284
	Rocket™	7 x 53mm	99283

## Prevail™ HPLC Columns (continued)

Packing	Format	i.d. x Length	Part No.
Silica, 5µm	Analytical	2.1 x 150mm	99273
	Solvent-Reducer	3.0 x 150mm	99339
	Solvent-Reducer	3.0 x 250mm	99340
	Analytical	4.6 x 150mm	99275
	Analytical	4.6 x 250mm	99277

## Prevail™ All-Guard™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
Select C18, 5µm	2.1 x 7.5mm	3	96690
	3.0 x 7.5mm	3	99119
	4.6 x 7.5mm	3	96455
C18, 5µm	2.1 x 7.5mm	3	96682
	3.0 x 7.5mm	3	99350
	4.6 x 7.5mm	3	99286
C8, 5µm	2.1 x 7.5mm	3	99128
	3.0 x 7.5mm	3	99351
	4.6 x 7.5mm	3	99287
Phenyl, 5µm	2.1 x 7.5mm	3	99130
	3.0 x 7.5mm	3	99352
	4.6 x 7.5mm	3	99288
Cyano, 5µm	2.1 x 7.5mm	3	99131
	3.0 x 7.5mm	3	99353
	4.6 x 7.5mm	3	99289
Amino, 5µm	4.6 x 7.5mm	3	99290
Silica, 5µm	2.1 x 7.5mm	3	99133
	3.0 x 7.5mm	3	99354
	4.6 x 7.5mm	3	99291
All-Guard™ Cartridge Holder		ea	80101

\*All-Guard™ holder required. Other particle sizes available.

# Alltech® Prevail™ Organic Acid Columns

## Get Unsurpassed Resolution for Common Organic Acids

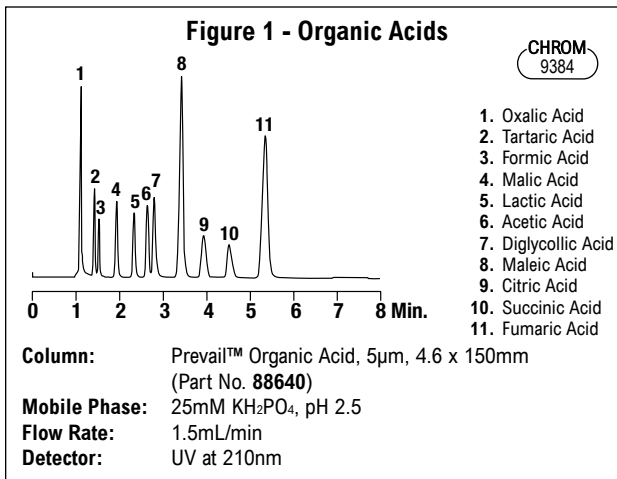
- Acid stable for long column lifetimes
- Silica-based for maximum efficiency and high-resolution
- Short run times and high sample throughput at ambient temperature with Rocket™ format
- Lower cost than polymeric organic acid columns

Prevail™ Organic Acid (OA) columns separate common organic acids with an unsurpassed combination of resolution, speed, sensitivity, and simplicity. A simple acidic phosphate buffer and a Prevail™ OA column at ambient temperature will separate 11 short-chain organic acids in less than 6 minutes.

Use pH to adjust column selectivity. Lowering the mobile phase pH progressively suppresses the ionization of the carboxylic acids, making them more hydrophobic. This gives you the ability to move these peaks relative to other peaks in the chromatogram, and it simplifies method development.

## Prevail™ HPLC Columns

Packing	Format	i.d. x Length	Standard Part No.	Waters® Fittings Part No.
OA, 3µm	Microbore	2.1 x 100mm	88648	—
	Analytical	4.6 x 100mm	88650	88750
	Analytical	4.6 x 150mm	88655	88755
	Rocket™	7 x 33mm	99292	—
	Rocket™	7 x 53mm	50755	—
OA, 5µm	Analytical	4.6 x 150mm	88640	88740
	Analytical	4.6 x 250mm	88645	88745



Separate 11 short-chain organic acids in less than six minutes.

## Prevail™ All-Guard™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
Organic Acid, 5µm	4.6 x 7.5mm	3	96429
All-Guard™ Cartridge Holder		ea	80101

\*All-Guard™ holder required. Other particle sizes available.



# Alltech® Prevail™ Carbohydrate ES Columns

Get Better Retention Times, Longer Column Life, and Improved Baselines Compared to Traditional Amino Carbohydrate Columns

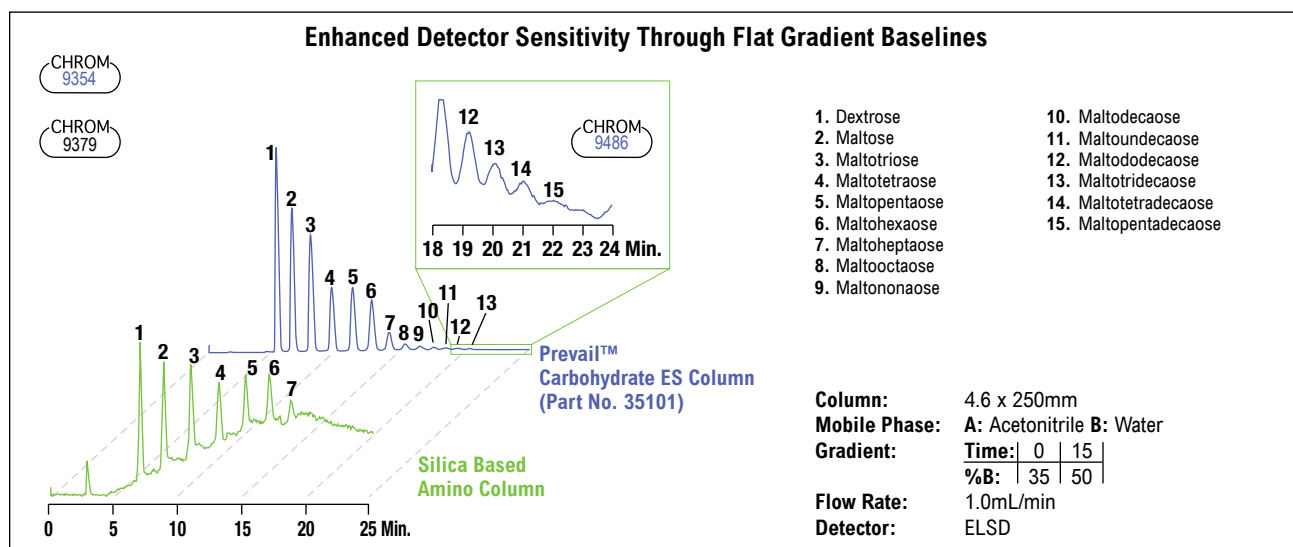
- Longer column life: Hybrid phase has the ruggedness of silica with the stability of a polymer
- Quieter baselines compared to traditional amino carbohydrate columns, even with gradients
- Reduce run times with more mobile phase choices
- Compatible with gradient ELSD applications

## Quiet Gradient Baselines

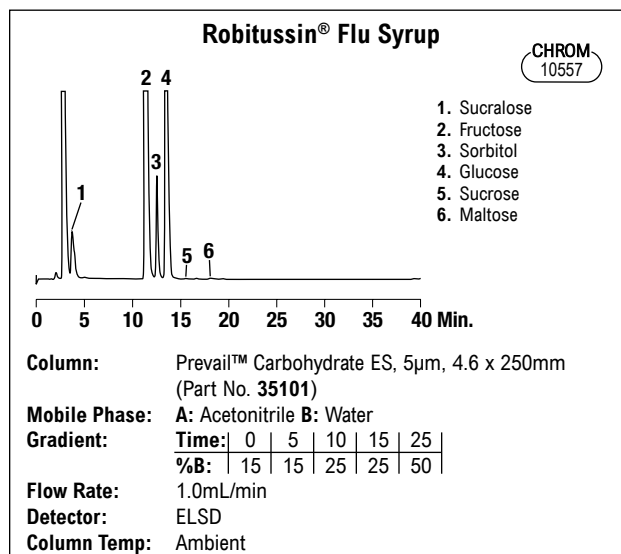
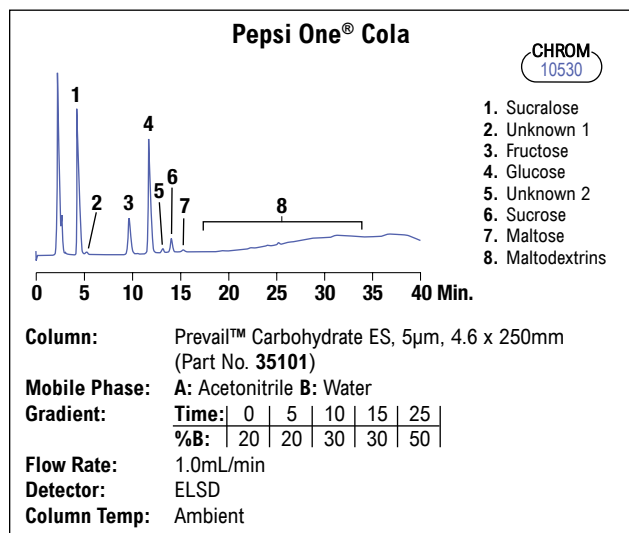
Prevail™ Carbohydrate ES Columns are excellent for isocratic separations with common detectors, but the column's real power shows with the ELSD and a solvent gradient. Enjoy the powerful selectivity, reduced run times, and efficient peaks from gradients while seeing the quiet, stable baselines that maximize sensitivity.

## Better Resolution and Peak Shape

Prevail™ Carbohydrate ES Columns are versatile enough for mono- and oligosaccharides and sugar alcohols. They produce single peaks for reducing sugars at ambient temperatures, eliminating the need for column heating.



Use gradients with a Prevail™ Carbohydrate ES column and the ELSD for shorter run times, better resolution, and greater sensitivity. By comparison, silica-based amino columns give noisy, shifting baselines.



### Prevail™ HPLC Columns

Packing	Format	i.d. x Length	Part No.
Carbohydrate ES,	Analytical	4.6 x 150mm	35102
5µm	Analytical	4.6 x 250mm	35101
	Rocket™	7 x 53mm	35104

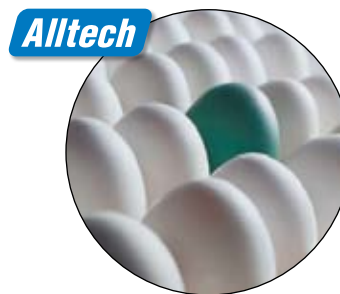
### Prevail™ All-Guard™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
Carbohydrate ES, 5µm	4.6 x 7.5mm	3	96435
All-Guard™ Cartridge Holder		ea	80101

\*All-Guard™ holder required. Other particle sizes available.



# Alltech® Platinum™ Columns



## For Challenging Separations

- Unique selectivity
- Better peak shapes with polar analytes
- More separation choices with dual-selectivity
- Excellent stability and reproducibility
- 1.5µm high throughput media for speed and resolution, especially when combined with Rocket™ and Expedite™ hardware

### The Platinum™ Column Advantage

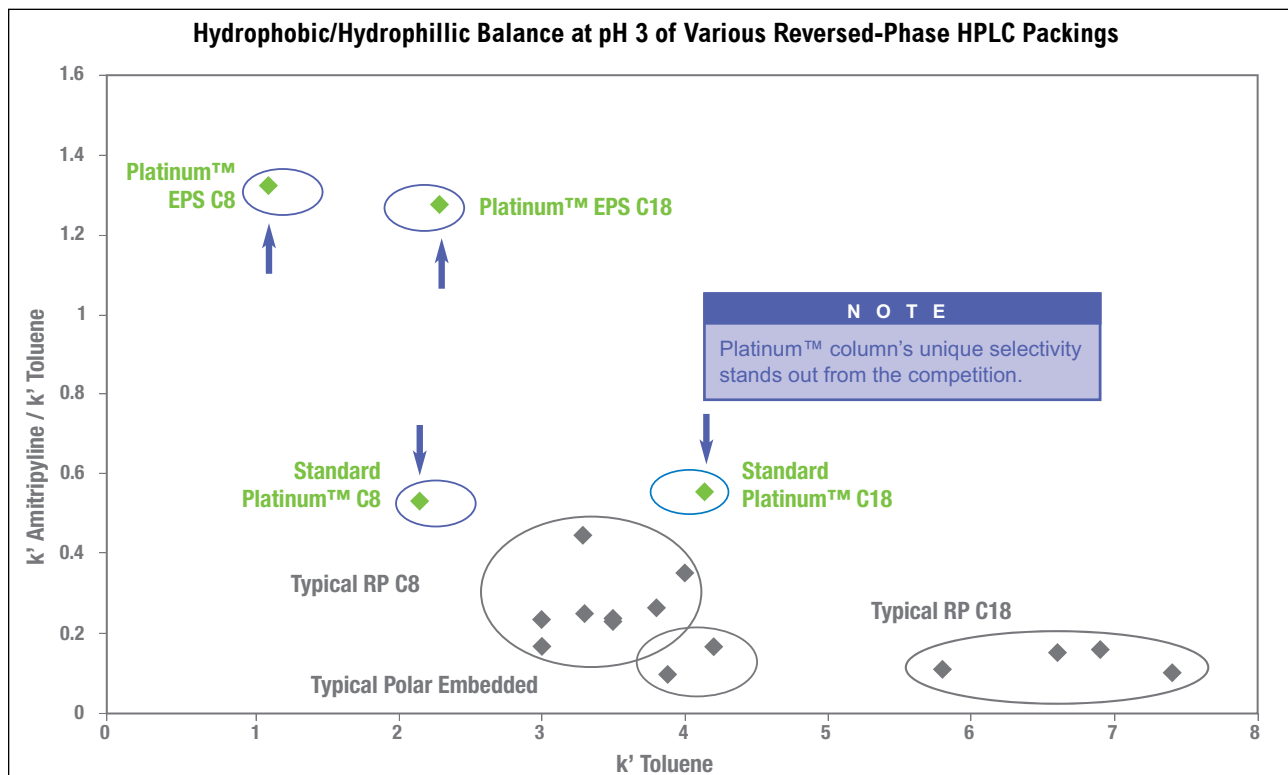
Controlled silica exposure is the difference that makes Platinum™ columns unique. Instead of thoroughly covering the silica with bonded phase to hide the silica, the exposure of the silica in Platinum™ columns is controlled to provide a dual mode separation with both polar and non-polar sites exposed to your samples. This extends polar selectivity well beyond what other reversed-phase columns offer and gives separations other columns cannot.

### Standard Platinum™ Columns vs Platinum™ EPS Columns

Platinum™ columns come in two varieties offering different levels of silica exposure. Standard Platinum™ has a moderate silica exposure and is best used with neutral and moderately polar compounds. Platinum™ EPS (Extended Polar Selectivity) has a high level of silica exposure and is best used with compounds containing more than two polar functional groups.

Alltech® Platinum™ Phase Specifications									
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
C18	Silica	Spherical	1.5, 3, 5µm	100Å	200m²/g	6%	Monomeric	Yes	L1
EPS C18	Silica	Spherical	1.5, 3, 5µm	100Å	200m²/g	5%	Monomeric	No	L1
C8	Silica	Spherical	1.5, 3, 5µm	100Å	200m²/g	4%	Monomeric	Yes	L7
EPS C8	Silica	Spherical	3, 5µm	100Å	200m²/g	2.50%	Monomeric	No	L7
Phenyl	Silica	Spherical	3, 5µm	100Å	200m²/g	—	Monomeric	Yes	L11
Cyano	Silica	Spherical	3, 5µm	100Å	200m²/g	—	Monomeric	No	L10
Amino (NH₂)	Silica	Spherical	3, 5µm	100Å	200m²/g	—	Monomeric	No	L8
Silica	Silica	Spherical	3, 5µm	100Å	200m²/g	—	—	—	L3
SAX	Silica	Spherical	3, 5µm*	100Å	200m²/g	—	Monomeric	No	—

Trying to solve difficult separation problems using typical reversed-phase columns often leads to the same result. Choose Platinum™ columns for completely different selectivity. See chart below.

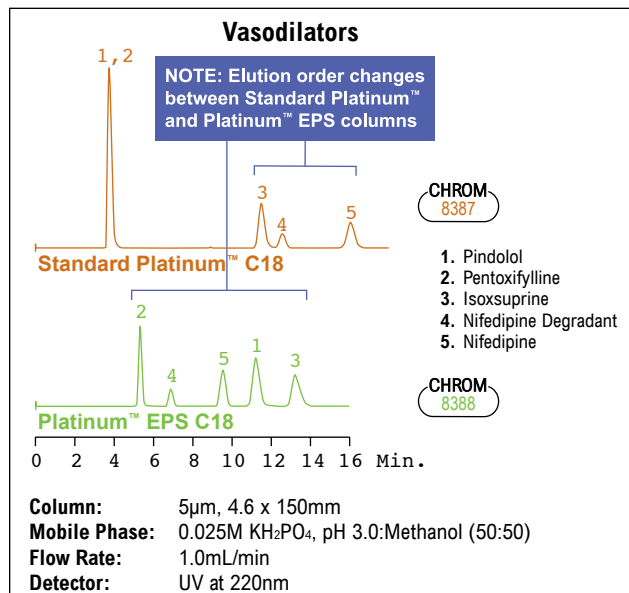


Plotting k' values of different compounds (polar vs. nonpolar) demonstrate the unique selectivity of Platinum™ and Platinum™ EPS columns, compared to conventional reversed-phase columns.



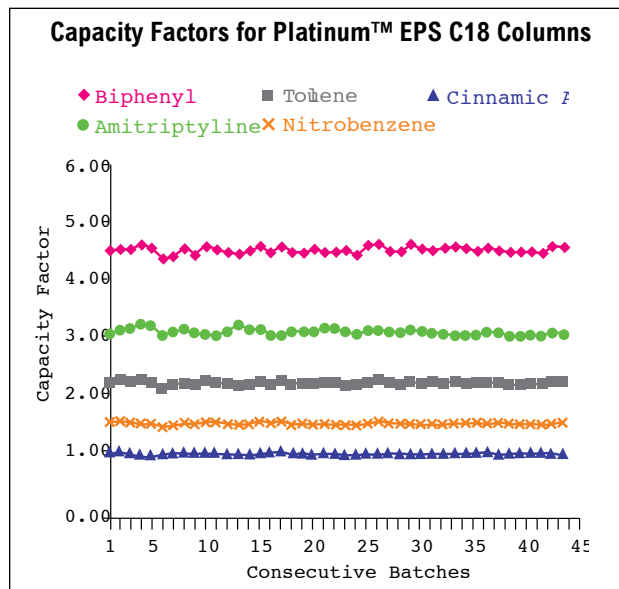
### Reverse Elution Order with Standard Platinum™ and Platinum™ EPS Columns

Often, it's preferable when minor components elute before, rather than after, closely retained major components.



### Platinum™ EPS Columns Have High Polar Compound Capacity

This is important for early eluting polar compounds which are often unresolved on conventional reversed-phase columns.



#### Platinum™ HPLC Columns

Packing	Format	i.d. x Length	Standard Part No.	Waters® Fittings Part No.	
C18, 1.5µm	Rocket™	7.0 x 33mm	50527	—	
	Rocket™	7.0 x 53mm	50529	—	
C18, 3µm	Solvent Reducer	3.0 x 150mm	32794	—	
	Analytical	4.6 x 100mm	32007	32009	
	Analytical	4.6 x 150mm	32020	32029	
	Rocket™	7.0 x 33mm	50525	—	
	Rocket™	7.0 x 53mm	50523	—	
C18, 5µm	Solvent Reducer	3.0 x 150mm	32793	—	
	Solvent Reducer	3.0 x 250mm	32792	—	
	Analytical	4.6 x 150mm	32043	32044	
	Analytical	4.6 x 250mm	32064	32068	
EPS C18, 1.5µm	Rocket™	7.0 x 33mm	50577	—	
	Rocket™	7.0 x 53mm	50579	—	
EPS C18, 3µm*	Capillary	0.150x 50mm	22300	—	
	Capillary	0.150x100mm	22430	—	
	Capillary	0.150x150mm	22431	—	
	Capillary	0.300x 50mm	22432	—	
	Capillary	0.300x100mm	22433	—	
	Capillary	0.300x150mm	22434	—	
	Solvent Reducer	3.0 x 150mm	32799	—	
	Analytical	4.6 x 100mm	32158	32161	
	Analytical	4.6 x 150mm	32183	32184	
	Rocket™	7.0 x 33mm	50575	—	
	Rocket™	7.0 x 53mm	50573	—	
	EPS C18, 5µm	Solvent Reducer	3.0 x 150mm	32806	—
		Solvent Reducer	3.0 x 250mm	32802	—
Analytical		4.6 x 150mm	32214	32216	
Analytical	4.6 x 250mm	32246	32247		
C8, 1.5µm	Rocket™	7.0 x 53mm	50529	—	
C8, 3µm	Rocket™	7.0 x 33mm	50532	—	
C8, 5µm	Analytical	4.6 x 150mm	32370	32371	
	Analytical	4.6 x 250mm	32375	32376	
EPS C8, 3µm	Analytical	4.6 x 150mm	32415	32416	
	Rocket™	7.0 x 33mm	50583	—	
	Rocket™	7.0 x 53mm	50585	—	
EPS C8, 5µm	Analytical	4.6 x 150mm	32420	32421	
	Analytical	4.6 x 250mm	32425	32426	

\*1.5µm and 5µm particles and other dimensions are available.

#### Platinum™ HPLC Columns (continued)

Packing	Format	i.d. x Length	Standard Part No.	Waters® Fittings Part No.
Phenyl, 3µm	Analytical	4.6 x 150mm	32631	32632
Phenyl, 5µm	Analytical	4.6 x 150mm	32636	32637
	Analytical	4.6 x 250mm	32641	32642
Cyano, 3µm	Rocket™	7.0 x 33mm	50593	—
	Rocket™	7.0 x 53mm	50595	—
Cyano, 5µm	Analytical	4.6 x 150mm	32672	32675
	Analytical	4.6 x 250mm	32681	32682
Amino, 3µm	Analytical	4.6 x 150mm	32706	32707
	Rocket™	7.0 x 53mm	50545	—
Amino, 5µm	Analytical	4.6 x 150mm	32713	32714
	Analytical	4.6 x 250mm	32722	32723
Silica, 3µm	Analytical	4.6 x 150mm	32535	32536
Silica, 5µm	Analytical	4.6 x 150mm	32542	32543
	Analytical	4.6 x 250mm	32549	32550
SAX, 3µm	Analytical	4.6 x 150mm	32952	32953
SAX, 5µm	Analytical	4.6 x 150mm	32944	32946
	Analytical	4.6 x 250mm	32943	32945

#### Platinum™ Guard Cartridges

Packing	i.d. x Length	Qty.	Part No.
C18 All-Guard™, 5µm*	3.0 x 7.5mm	3	99115
	4.6 x 7.5mm	3	32606
EPS C18, 3µm	0.150 x 10mm	—	22693
Capillary Guard**	0.300 x 10mm	—	22694
EPS C18 All-Guard™, 5µm*	3.0 x 7.5mm	3	99117
	4.6 x 7.5mm	3	32607
C8 All-Guard™, 5µm*	4.6 x 7.5mm	3	32612
EPS C8 All-Guard™, 5µm*	4.6 x 7.5mm	3	32614
Phenyl All-Guard™, 5µm*	4.6 x 7.5mm	3	32619
Cyano All-Guard™, 5µm*	4.6 x 7.5mm	3	32620
Amino All-Guard™, 5µm*	4.6 x 7.5mm	3	32621
Silica All-Guard™, 5µm*	4.6 x 7.5mm	3	32622
SAX All-Guard™, 5µm*	4.6 x 7.5mm	3	32787
All-Guard™ Cartridge Holder		ea	80101
(Includes Direct-Connect Column Coupler)			
Capillary Guard Cartridge Holder			
Guard Holder for 0.100mm and 0.150mm Guards		ea	GR-3710E
Guard Holder for 0.300mm and 0.500mm Guards		ea	GR-3710A

\*All-Guard™ holder required.

\*\*1.5µm and 5µm particles and other dimensions are available.

# GraceSmart™ Columns



## High Quality HPLC Phases at Exceptional Value

- High purity phases
- Efficient and reproducible separations
- General use selectivity
- Exceptional value

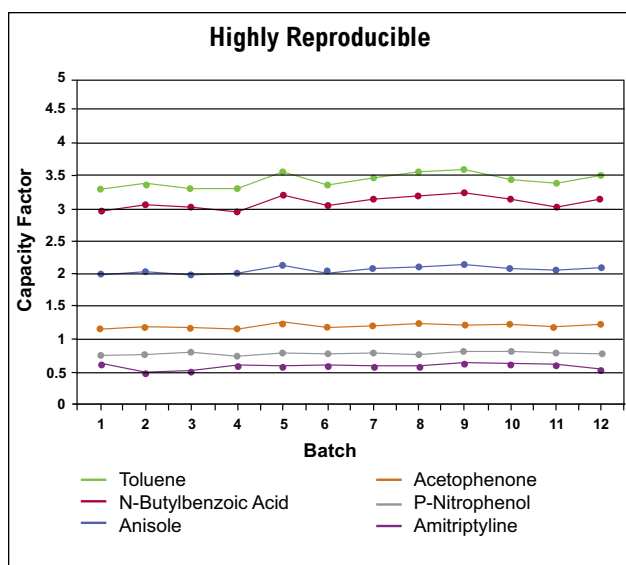
GraceSmart™ HPLC phases use high-purity silica and are monomerically bonded with uniform coverage. This translates into symmetrical peaks for acids/bases, and predictable reversed-phase selectivity. Whether routine analysis or new method development, use GraceSmart™ columns to get premium performance at exceptional value.

GraceSmart™ Phase Specifications				
Phase	Encapping	Surface Area	Pore Size	Particle Size
C18	TMS, non-polar	220m <sup>2</sup> /g	120Å	3, 5µm

hplc columns | small molecule

## Reproducible Methods Start with Reproducible Columns

Our tightly controlled silica synthesis and bonding keep capacity factor and selectivity variations to a minimum. The advanced packing methods deliver consistently high column-to-column efficiency. Every column is individually tested and shipped with a quality assurance chromatogram.



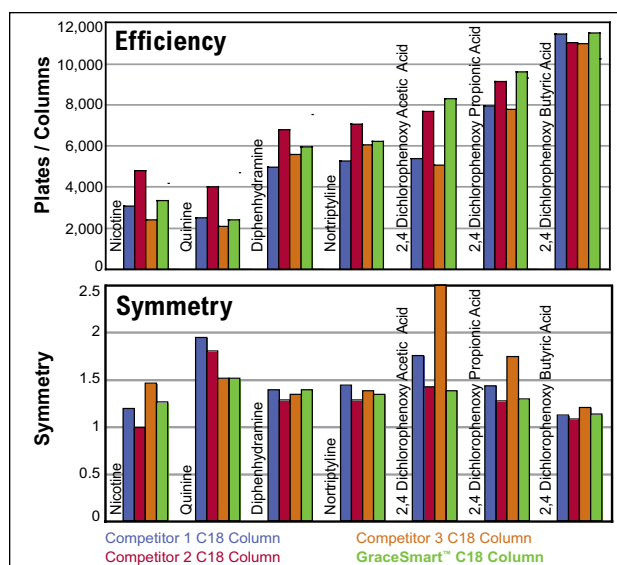
Consistent batch-to-batch capacity for acidic, basic, and neutral compounds.

### GraceSmart™ RP18 Columns

Packing	Format	i.d. x Length	Part No.
C18, 5µm	Analytical	4.6 x 150mm	<b>5138812</b>
	Analytical	4.6 x 250mm	<b>5138810</b>
	Analytical	2.1 x 150mm	<b>5138811</b>
	Analytical	2.1 x 250mm	<b>5138813</b>
C18, 3µm	Analytical	4.6 x 150mm	<b>5141752</b>
	Analytical	4.6 x 100mm	<b>5141753</b>
	Analytical	2.1 x 150mm	<b>5141754</b>
	Analytical	2.1 x 100mm	<b>5141755</b>
	Analytical	2.1 x 50mm	<b>5141756</b>
	Analytical	4.6 x 50mm	<b>5141811</b>

## Expect Competitive Performance

Six sigma techniques and lean manufacturing are key to our cost competitive position, without compromising quality or performance. GraceSmart™ columns show similar or better efficiency and asymmetries for challenging base and acid components in comparison to industry leading columns.

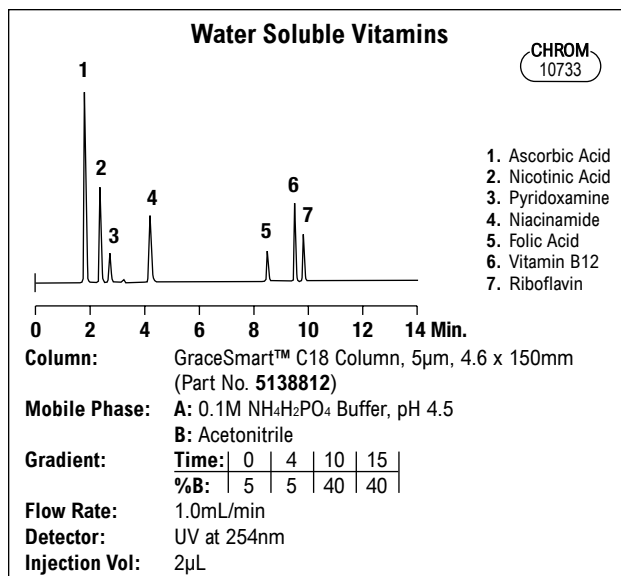
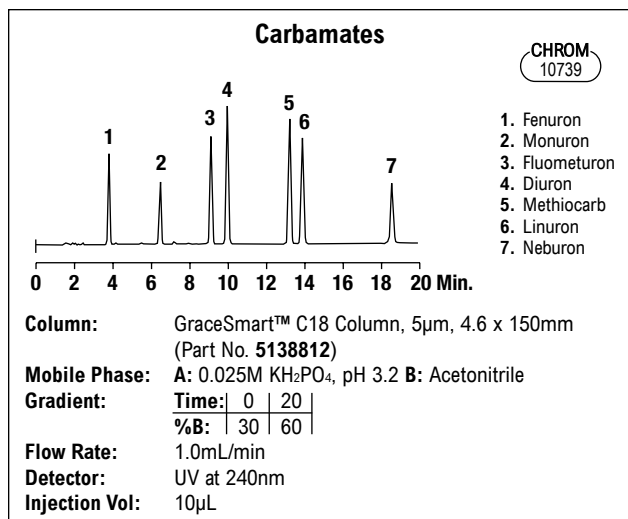
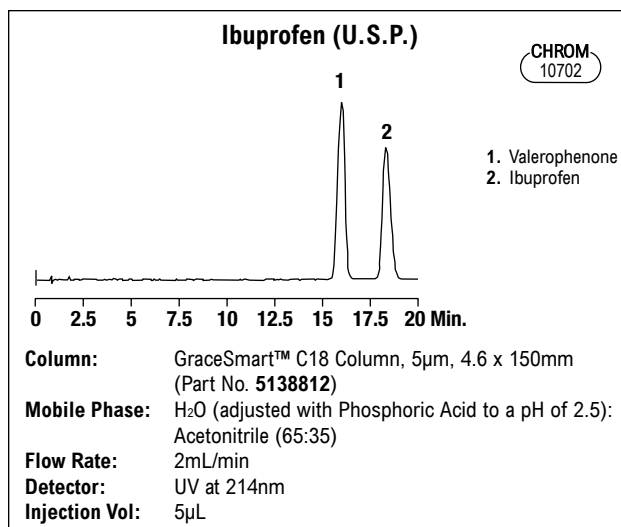
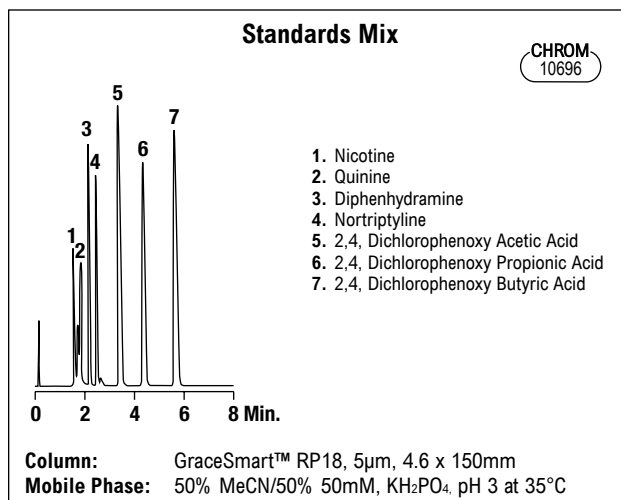
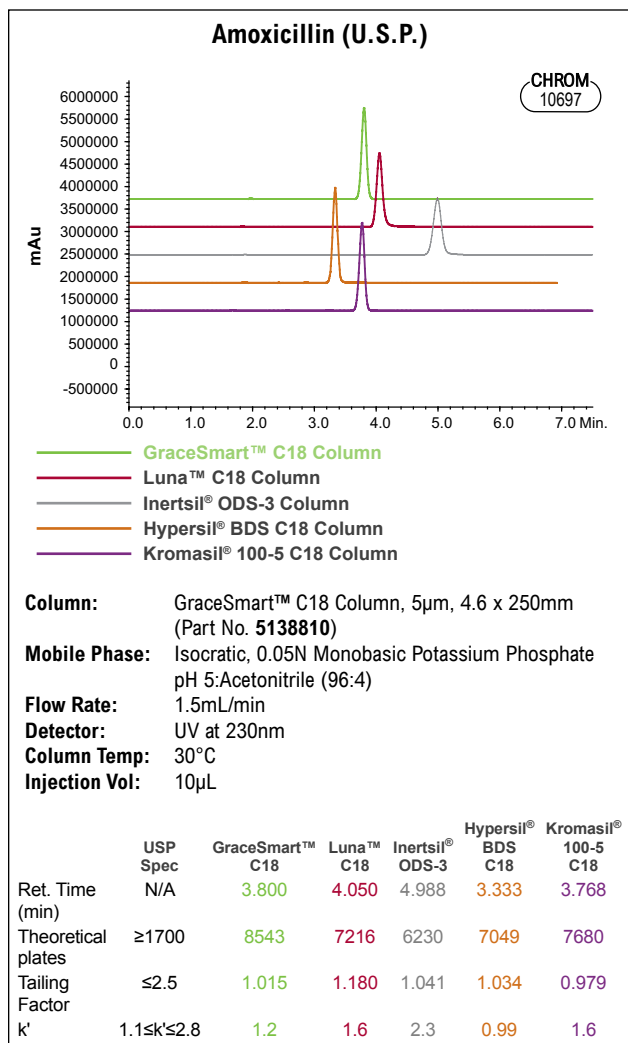


GraceSmart™ columns compare favorably to leading competitor columns.



# GraceSmart™ Columns

hplc columns | small molecule



## more applications

To view our complete searchable chromatogram database visit [www.discoverysciences.com/chromdb/](http://www.discoverysciences.com/chromdb/)



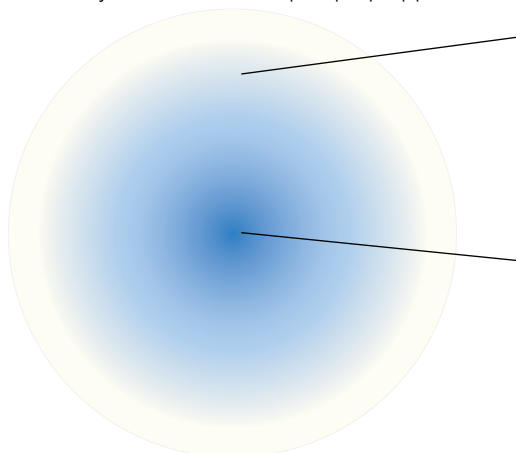
# GraceAlpha™ Columns (Patent Pending)

## A New Silica Generation

- High-porosity surface increases mass transfer and results in increased column efficiencies and loading capacity
- Dense core and highly spherical shape yields mechanically robust particle
- Proprietary bonding technology gives unique selectivity and increased resolution
- Ideally suited for scale up to prep applications



hplc columns | small molecule



### Extreme Porosity

High-porosity exterior increases mass transfer leading to higher efficiencies and superior loading capacity.

The high-porosity structure adds an elastic quality to the silica surface allowing the particles to pack tighter yielding higher efficiencies. It also stabilizes the packed bed preventing voids.

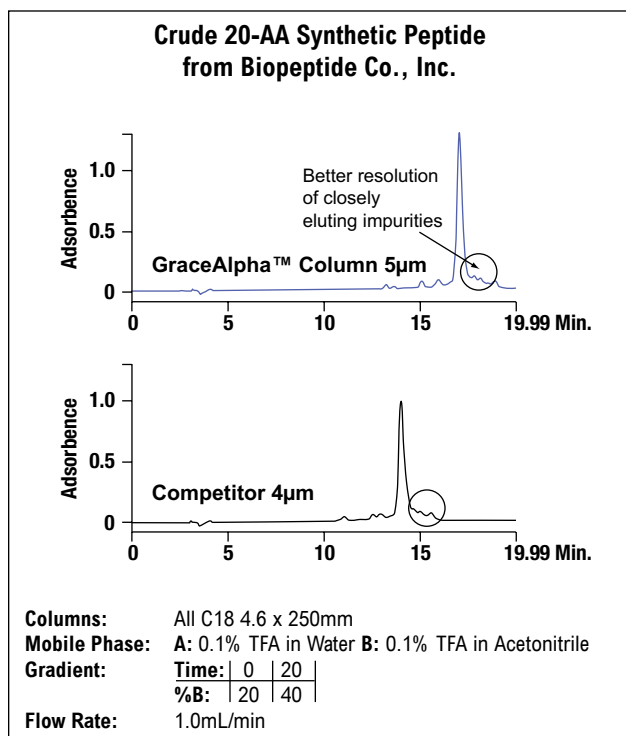
### Dense Inner Core

Dense core provides exceptional strength. Typically the high-porosity structure would result in a weak particle prone to breaking, but the GraceAlpha™ particle combines the high porosity outer region with a dense inner core that results in a particle that resists breaking and forming fines that contribute to high backpressures.

GraceAlpha™ Phase Specifications									
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
C18	Silica	Spherical	5, 10, 15, 20µm	120Å	325m <sup>2</sup> /g	15%	Monomeric	Yes	L1
C8	Silica	Spherical	5, 10, 15, 20µm	120Å	325m <sup>2</sup> /g	10%	Monomeric	—	L7
Silica	Silica	Spherical	5, 10, 15, 20µm	120Å	325m <sup>2</sup> /g	—	Monomeric	—	L3

## High Level of Resolution

GraceAlpha™ offers resolution advantages due to its higher mass transfer and optimized C18 and C8 bonding chemistry.



The target peptide is better resolved from impurities, with 33% higher recovery, on the GraceAlpha™ column.

## GraceAlpha™ Columns

Packing	i.d. x Length	Part No.
C18, 5µm	4.6 x 150mm	5140743
	4.6 x 250mm	5140702
C18, 10µm	4.6 x 150mm	5140744
	4.6 x 250mm	5140701
C18, 15µm	4.6 x 150mm	5141058
	4.6 x 250mm	5141059
C8, 5µm	4.6 x 150mm	5140740
	4.6 x 250mm	5140704
C8, 10µm	4.6 x 150mm	5140742
	4.6 x 250mm	5140703
C8, 15µm	4.6 x 150mm	5141055
	4.6 x 250mm	5141057
Silica, 5µm	4.6 x 150mm	5140740
	4.6 x 250mm	5140704
Silica, 10µm	4.6 x 150mm	5140742
	4.6 x 250mm	5140703
Silica, 15µm	4.6 x 150mm	5141055
	4.6 x 250mm	5141057

## more applications

To view our complete searchable chromatogram database visit [www.discoverysciences.com/chromdb/](http://www.discoverysciences.com/chromdb/)



# Alltech® Brava™ Columns



If You Like Hypersil® BDS, Try This Lower-Cost Alternative

- BDS phases for acids, bases, and neutrals
- ODS phases for non-polars and lipophilics

Medium-sized pores are ideal for resolution of small- to medium-sized compounds, while its less-retentive nature means less mobile phase consumption.

Alltech



Brava™ Phase Specifications									
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
C18 BDS	Silica	Spherical	3, 5µm	145Å	185m <sup>2</sup> /g	8.5%	Monomeric	Yes	L1
C18 ODS	Silica	Spherical	3, 5µm	130Å	195m <sup>2</sup> /g	8.5%	Monomeric	Yes	L1
C8	Silica	Spherical	3, 5µm	130Å	195m <sup>2</sup> /g	6%	Monomeric	Yes	L7
C8 BDS	Silica	Spherical	3, 5µm	145Å	185m <sup>2</sup> /g	5.5%	Monomeric	Yes	L7
Phenyl	Silica	Spherical	5µm	130Å	195m <sup>2</sup> /g	—	Monomeric	No	L11
Cyano	Silica	Spherical	5µm	130Å	195m <sup>2</sup> /g	—	Monomeric	No	L10
Cyano BDS	Silica	Spherical	5µm	145Å	185m <sup>2</sup> /g	—	Monomeric	No	L10
Amino (NH <sub>2</sub> )	Silica	Spherical	5µm	130Å	195m <sup>2</sup> /g	—	Monomeric	No	L8
Silica	Silica	Spherical	5µm	130Å	195m <sup>2</sup> /g	—	—	No	L3

## Brava™ HPLC Columns

Packing	i.d. x Length	Part No.	Waters® Fittings Part No.
C18 BDS, 3µm	4.6 x 100mm	50910	50911
	4.6 x 150mm	50912	50913
C18 BDS, 5µm	4.6 x 150mm	50914	50915
	4.6 x 250mm	50916	50917
C18 ODS, 3µm	4.6 x 100mm	50957	50959
	4.6 x 150mm	50961	50963
C18 ODS, 5µm	4.6 x 150mm	50965	50967
	4.6 x 250mm	50969	50971
C8 BDS, 3µm	4.6 x 100mm	50918	50919
	4.6 x 150mm	50920	50921
C8 BDS, 5µm	4.6 x 150mm	50922	50923
	4.6 x 250mm	50924	50925
C8, 3µm	4.6 x 100mm	50939	50943
	4.6 x 150mm	50945	50947
C8, 5µm	4.6 x 150mm	50949	50951
	4.6 x 250mm	50953	50955
Phenyl, 5µm	4.6 x 150mm	50978	50979
	4.6 x 250mm	50981	50983
Cyano BDS, 5µm	4.6 x 150mm	50926	50927
	4.6 x 250mm	50928	50929
Cyano, 5µm	4.6 x 150mm	50973	50975
	4.6 x 250mm	50976	50977
Amino, 5µm	4.6 x 150mm	50930	50931
	4.6 x 250mm	50933	50934
Silica, 5µm	4.6 x 150mm	50935	50936
	4.6 x 250mm	50937	50938

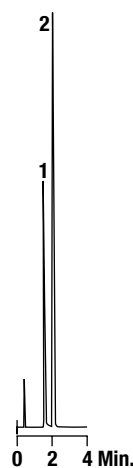
## Brava™ All-Guard™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
C18 BDS, 5µm	4.6 x 7.5mm	3	96472
C18 ODS, 5µm	4.6 x 7.5mm	3	96477
C8 BDS, 5µm	4.6 x 7.5mm	3	96473
C8, 5µm	4.6 x 7.5mm	3	96478
Phenyl, 5µm	4.6 x 7.5mm	3	96480
Cyano BDS, 5µm	4.6 x 7.5mm	3	96474
Cyano, 5µm	4.6 x 7.5mm	3	96479
Amino, 5µm	4.6 x 7.5mm	3	96475
Silica, 5µm	4.6 x 7.5mm	3	96476
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	80101

\*All-Guard™ holder required. Other particle sizes available.

## Metal Chelator

CHROM  
10473



1. Pyridine
2. 2, 2' Dipyridyl

**Column:** Brava™ C18 BDS, 5µm, 4.6 x 150mm  
(Part No. 50914)  
**Mobile Phase:** Acetonitrile:50mM KH<sub>2</sub>PO<sub>4</sub> pH 3 (50:50)  
**Flow Rate:** 1.0mL/min  
**Detector:** UV at 254nm

## more applications

To view our complete searchable chromatogram database visit  
[www.discoverysciences.com/chromdb/](http://www.discoverysciences.com/chromdb/)



# Alltech® Alltima™ Introduction



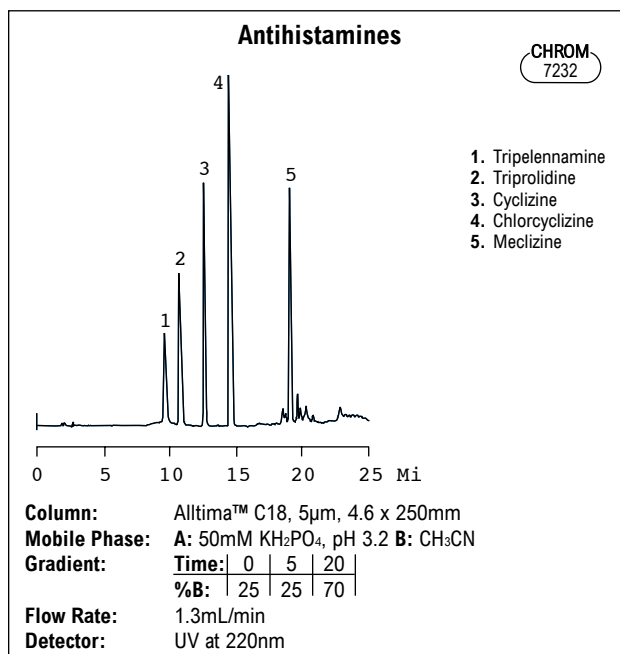
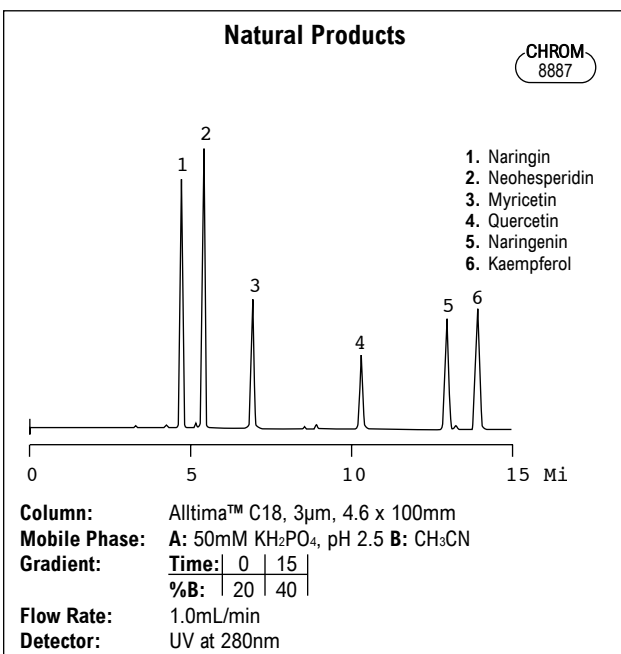
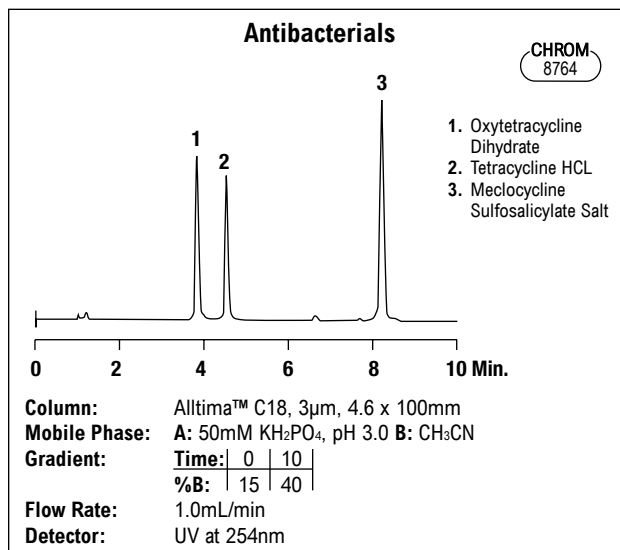
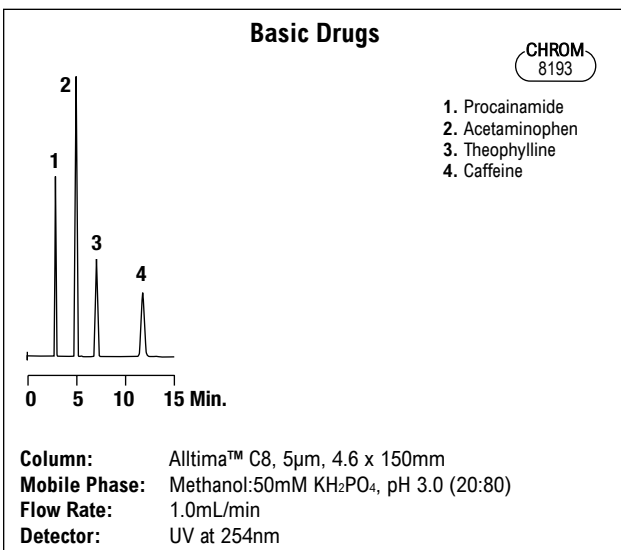
## High-Quality General-Purpose HPLC Columns

- Extensive collection of published applications
- Well suited for microbore applications, stable in popular microbore mobile phases
- Acid and base deactivated symmetrical peaks
- Polymerically bonded and double-encapped for long column lifetimes
- Analyze acids, bases, and neutrals in one run
- Full range of column dimensions, from microbore to preparative

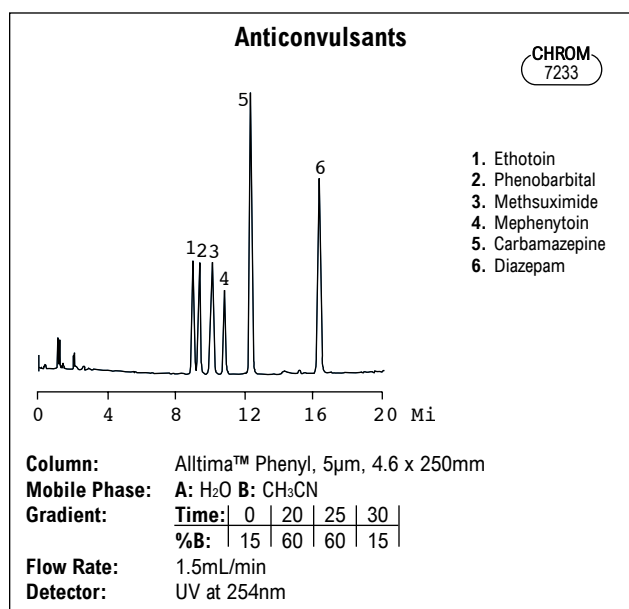
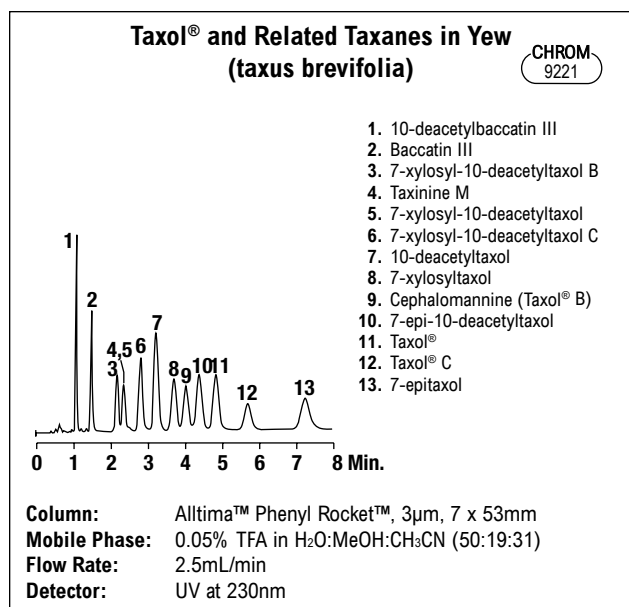


### Alltima™ Phase Specifications

Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
C18	Silica	Spherical	3, 5, 10µm	100Å	340m <sup>2</sup> /g	16%	Polymeric	Yes	L1
C18 LL	Silica	Spherical	5µm	100Å	340m <sup>2</sup> /g	9%	Polymeric	Yes	L1
C8	Silica	Spherical	3, 5, 10µm	100Å	340m <sup>2</sup> /g	9%	Polymeric	Yes	L7
Phenyl	Silica	Spherical	3, 5µm	100Å	340m <sup>2</sup> /g	7.5%	Polymeric	Yes	L11
Cyano	Silica	Spherical	3, 5µm	100Å	340m <sup>2</sup> /g	—	Polymeric	Yes	L10
Amino (NH <sub>2</sub> )	Silica	Spherical	3, 5µm	100Å	340m <sup>2</sup> /g	—	Polymeric	No	L8
Silica	Silica	Spherical	3, 5, 10µm	100Å	340m <sup>2</sup> /g	—	—	—	L3



# Alltech® Alltima™ Reversed-Phase Columns



**Alltima™ All-Guard™ Cartridges\***

Packing	i.d. x Length	Qty.	Part No.
C18, 5µm	2.1 x 7.5mm	3	96680
	3.0 x 7.5mm	3	96361
	4.6 x 7.5mm	3	96080
C18-LL, 5µm	2.1 x 7.5mm	3	96432
	3.0 x 7.5mm	3	96433
	4.6 x 7.5mm	3	96285
C8, 5µm	2.1 x 7.5mm	3	96441
	3.0 x 7.5mm	3	96362
	4.6 x 7.5mm	3	96081
Phenyl, 5µm	2.1 x 7.5mm	3	96442
	3.0 x 7.5mm	3	96445
	4.6 x 7.5mm	3	96082
All-Guard™ Cartridge Holder		ea	80101

*(Includes Direct-Connect Column Coupler)*

\*All-Guard™ holder required. Other particle sizes available.

**Alltima™ HPLC Reversed-Phase Columns**

Packing	Format	i.d. x Length	Standard Part No.	Waters® Fittings Part No.	
C18, 3µm	Microbore	1.0 x 100mm	43853	—	
	Microbore	1.0 x 150mm	43864	—	
	Expedito™ MS	2.1 x 10mm	43836	—	
	Expedito™ MS	2.1 x 20mm	43803	—	
	Microbore	2.1 x 50mm	43849	—	
	Microbore	2.1 x 100mm	43821	—	
	Microbore	2.1 x 150mm	43852	—	
	Solvent Reducer	3.0 x 150mm	81143	—	
	Expedito™ MS	4.6 x 10mm	43837	—	
	Expedito™ MS	4.6 x 20mm	43851	—	
	Analytical	4.6 x 50mm	81412	—	
	Analytical	4.6 x 100mm	81382	81383	
	Analytical	4.6 x 150mm	81387	81388	
	Rocket™	7 x 33mm	50603	—	
Rocket™	7 x 53mm	50605	—		
C18, 5µm	Microbore	1.0 x 150mm	88384	—	
	Microbore	1.0 x 250mm	88385	—	
	Microbore	2.1 x 150mm	88370	—	
	Microbore	2.1 x 250mm	88371	—	
	Solvent Reducer	3.0 x 150mm	81140	—	
	Solvent Reducer	3.0 x 250mm	81142	—	
	Analytical	4.6 x 150mm	88052	88053	
	Analytical	4.6 x 250mm	88056	88057	
	C18, 10µm	Analytical	4.6 x 250mm	88307	88308
	C18-LL, 5µm	Microbore	1.0 x 150mm	88390	—
Microbore		1.0 x 250mm	88391	—	
Microbore		2.1 x 150mm	88388	—	
Microbore		2.1 x 250mm	88389	—	
Solvent Reducer		3.0 x 150mm	81144	—	
Solvent Reducer		3.0 x 250mm	81145	—	
Analytical		4.6 x 150mm	88069	88082	
Analytical		4.6 x 250mm	88099	88235	
C8, 3µm		Analytical	4.6 x 50mm	81413	—
		Analytical	4.6 x 100mm	81392	81393
	Analytical	4.6 x 150mm	81397	81398	
	Rocket™	7 x 33mm	50607	—	
	Rocket™	7 x 53mm	50609	—	
C8, 5µm	Microbore	1.0 x 150mm	88394	—	
	Microbore	1.0 x 250mm	88395	—	
	Microbore	2.1 x 150mm	88372	—	
	Microbore	2.1 x 250mm	88373	—	
	Solvent Reducer	3.0 x 150mm	81146	—	
	Analytical	4.6 x 150mm	88072	88073	
C8, 10µm	Analytical	4.6 x 250mm	88317	88318	
	Phenyl, 3µm	Microbore	1.0 x 100mm	43892	—
Phenyl, 3µm	Microbore	1.0 x 150mm	43854	—	
	Expedito™ MS	2.1 x 10mm	43809	—	
	Expedito™ MS	2.1 x 20mm	43865	—	
	Microbore	2.1 x 50mm	43835	—	
	Microbore	2.1 x 100mm	43866	—	
	Microbore	2.1 x 150mm	43813	—	
	Expedito™ MS	4.6 x 10mm	43883	—	
	Expedito™ MS	4.6 x 20mm	43822	—	
	Analytical	4.6 x 50mm	81178	—	
	Analytical	4.6 x 100mm	81181	88184	
Phenyl, 5µm	Analytical	4.6 x 150mm	81188	81191	
	Solvent Reducer	3.0 x 150mm	81147	—	
	Analytical	4.6 x 150mm	88087	88088	
Analytical	4.6 x 250mm	88092	88093		

hplc columns | small molecule



# Alltech® Alltima™ C18 Validation Kits

Alltima™ columns have the batch-to-batch and column-to-column reproducibility required for method development. Each kit includes three columns made from three different batches of Alltima™ C18.

### Alltima™ C18 Validation Kits

Description	Includes:	i.d. x Length	Part No.
C18, 3µm	3 columns from 3 different batches	4.6 x 100mm	11350
C18, 5µm	3 columns from 3 different batches	4.6 x 150mm	11541
C18, 5µm	3 columns from 3 different batches	4.6 x 250mm	11543

# Alltech® Alltima™ Normal-Phase Columns

### Alltima™ HPLC Normal-Phase Columns

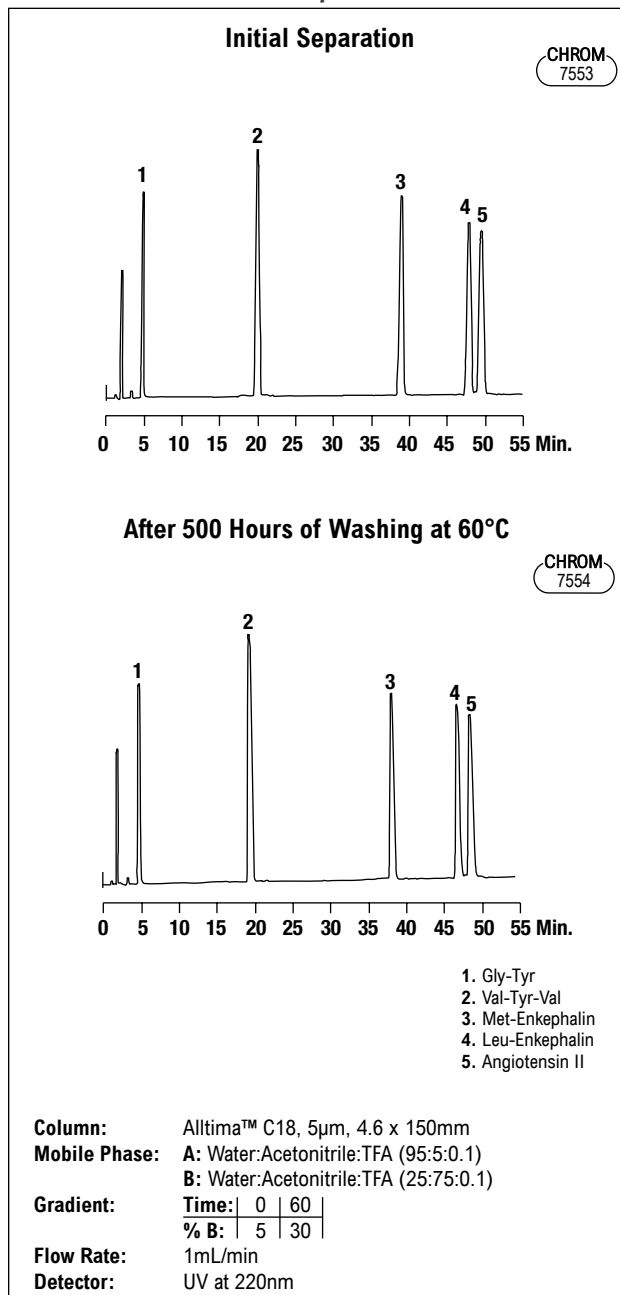
Packing	Format	i.d. x Length	Standard Part No.	Waters® Fittings Part No.
Cyano, 3µm	Analytical	4.6 x 50mm	81179	—
	Analytical	4.6 x 100mm	81182	81186
	Analytical	4.6 x 150mm	81189	81192
Cyano, 5µm	Analytical	4.6 x 150mm	88180	88182
	Analytical	4.6 x 250mm	88189	88191
Amino, 3µm	Analytical	4.6 x 50mm	81180	—
	Analytical	4.6 x 100mm	81183	81187
	Analytical	4.6 x 150mm	81190	81193
Amino, 5µm	Analytical	4.6 x 150mm	88205	88207
	Analytical	4.6 x 250mm	88217	88218
Silica, 3µm	Microbore	1.0 x 100mm	43824	—
	Microbore	1.0 x 150mm	43855	—
	Expedite™ MS	2.1 x 10mm	43891	—
	Expedite™ MS	2.1 x 20mm	43801	—
	Microbore	2.1 x 50mm	43876	—
	Microbore	2.1 x 100mm	43823	—
	Microbore	2.1 x 150mm	43884	—
	Expedite™ MS	4.6 x 10mm	43889	—
	Expedite™ MS	4.6 x 20mm	43886	—
	Analytical	4.6 x 50mm	81414	—
Silica, 5µm	Analytical	4.6 x 100mm	81404	81405
	Analytical	4.6 x 150mm	81409	81410
	Analytical	4.6 x 250mm	88123	88124
Silica, 10µm	Analytical	4.6 x 250mm	88171	88172
	Analytical	4.6 x 250mm	88327	88328

### Alltima™ All-Guard™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
Cyano, 5µm	4.6 x 7.5mm	3	96084
Amino, 5µm	4.6 x 7.5mm	3	96085
Silica, 5µm	2.1 x 7.5mm	3	96450
	4.6 x 7.5mm	3	96083
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	80101

\*All-Guard™ holder required. Other particle sizes available.

### Alltima™ is Stable and Reproducible



Column capacity and selectivity remained constant after washing an Alltima™ C18 column for 500 hours with 0.5% TFA:Acetonitrile (50:50) at 60°C.

### tech tip

Want high throughput on a conventional (non-ultra high-pressure) system?

Choose the Rocket™ column format—no modifications necessary to your existing HPLC system. Choose Expedite™ columns for low volume and microbore systems. See page 31 for more explanation of the Rocket™ and Expedite™ formats.

## Alltech® Apollo™ Columns

best  
value

## Economical, High Performance Columns

- Easy scale-up from analytical to prep
- Extended pH stability—1.5 to 10.5

Batch-tested Apollo™ HPLC columns use high purity, base-deactivated silica for powerful separations at an economical price. They are ideal for educational labs or for method development.



Apollo™ Phase Specifications									
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
C18	Silica	Spherical	5µm	100Å	340m <sup>2</sup> /g	15%	Monomeric	Yes	L1
C8	Silica	Spherical	5µm	100Å	340m <sup>2</sup> /g	9%	Monomeric	Yes	L7
Phenyl	Silica	Spherical	5µm	100Å	340m <sup>2</sup> /g	8%	Monomeric	Yes	L11
Silica	Silica	Spherical	5µm	100Å	340m <sup>2</sup> /g	—	—	—	L3

## Apollo™ HPLC Columns

Packing	Format	i.d. x Length	Part No.
C18, 5µm	Analytical	4.6 x 150mm	<b>36505</b>
	Analytical	4.6 x 250mm	<b>36511</b>
C8, 5µm	Analytical	4.6 x 150mm	<b>36506</b>
	Analytical	4.6 x 250mm	<b>36512</b>
Phenyl, 5µm	Analytical	4.6 x 150mm	<b>36538</b>
	Analytical	4.6 x 250mm	<b>36544</b>
Silica, 5µm	Analytical	4.6 x 150mm	<b>36507</b>
	Analytical	4.6 x 250mm	<b>36513</b>

## Apollo™ All-Guard™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
C18, 5µm	4.6 x 7.5mm	3	<b>96454</b>
C8, 5µm	4.6 x 7.5mm	3	<b>96463</b>
Phenyl, 5µm	4.6 x 7.5mm	3	<b>96430</b>
Silica, 5µm	4.6 x 7.5mm	3	<b>96419</b>
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	<b>80101</b>

\*All-Guard™ holder required. Other particle sizes available.

## Alltech® Econosphere™ Columns

- Low-cost columns for common chromatography applications
- Acid-washed for low metal content
- Easy scale-up from analytical to prep

Econosphere™ Phase Specifications									
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
C18	Silica	Spherical	3, 5, 10µm	80Å	200m <sup>2</sup> /g	10%	Monomeric	Yes	L1
C8	Silica	Spherical	3, 5, 10µm	80Å	200m <sup>2</sup> /g	5%	Monomeric	Yes	L7
Cyano	Silica	Spherical	5µm	80Å	200m <sup>2</sup> /g	—	Monomeric	Yes	L10
Amino (NH <sub>2</sub> )	Silica	Spherical	5µm	80Å	200m <sup>2</sup> /g	—	Polymeric	Yes	L8
Silica	Silica	Spherical	3, 5, 10µm	80Å	200m <sup>2</sup> /g	—	—	No	L3

## Econosphere™ HPLC Columns

Packing	Format	i.d. x Length	Standard Part No.	Waters® Part No.
C18, 3µm	Analytical	4.6 x 50mm	<b>70153</b>	<b>70156</b>
	Analytical	4.6 x 100mm	<b>70154</b>	<b>70157</b>
	Analytical	4.6 x 150mm	<b>70155</b>	<b>70158</b>
	Rocket™	7 x 33mm	<b>50673</b>	—
	Rocket™	7 x 53mm	<b>50675</b>	—
C18, 5µm	Analytical	4.6 x 150mm	<b>70065</b>	<b>70070</b>
	Analytical	4.6 x 250mm	<b>70066</b>	<b>70071</b>
C8, 3µm	Analytical	4.6 x 50mm	<b>70165</b>	<b>70168</b>
	Analytical	4.6 x 100mm	<b>70166</b>	<b>70169</b>
	Analytical	4.6 x 150mm	<b>70167</b>	<b>70170</b>
C8, 5µm	Analytical	4.6 x 150mm	<b>70085</b>	<b>70090</b>
	Analytical	4.6 x 250mm	<b>70086</b>	—
Cyano, 5µm	Analytical	4.6 x 150mm	<b>70025</b>	<b>70030</b>
	Analytical	4.6 x 250mm	<b>70026</b>	<b>70031</b>

## Econosphere™ HPLC Columns (continued)

Packing	Format	i.d. x Length	Standard Part No.	Waters® Part No.
Amino, 5µm	Analytical	4.6 x 150mm	<b>70045</b>	<b>70050</b>
	Analytical	4.6 x 250mm	<b>70046</b>	<b>70051</b>
Silica, 3µm	Analytical	4.6 x 50mm	<b>70177</b>	<b>70180</b>
	Analytical	4.6 x 100mm	<b>70178</b>	<b>70181</b>
	Analytical	4.6 x 150mm	<b>70179</b>	<b>70182</b>
Silica, 5µm	Analytical	4.6 x 150mm	<b>70005</b>	<b>70010</b>
	Analytical	4.6 x 250mm	<b>70006</b>	<b>70011</b>

## Econosphere™ All-Guard™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
C18	4.6 x 7.5mm	3	<b>96121</b>
C8	4.6 x 7.5mm	3	<b>96122</b>
Cyano	4.6 x 7.5mm	3	<b>96123</b>
Amino	4.6 x 7.5mm	3	<b>96124</b>
Silica	4.6 x 7.5mm	3	<b>96125</b>
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	<b>80101</b>

\*Guard holder required.

# Alltech® Adsorbosphere™ Columns

- Reliable performance from rugged, reproducible phases

High temperature bonding for exceptional surface coverage, stability, and reproducibility. Adsorbosphere™ columns are the workhorses of any chromatography lab. Choose from four varieties:



**Adsorbosphere™** has a moderate carbon load for common applications.

**Adsorbosphere™ HS** has a larger surface area and higher carbon load for stronger retention of hydrophobic compounds.

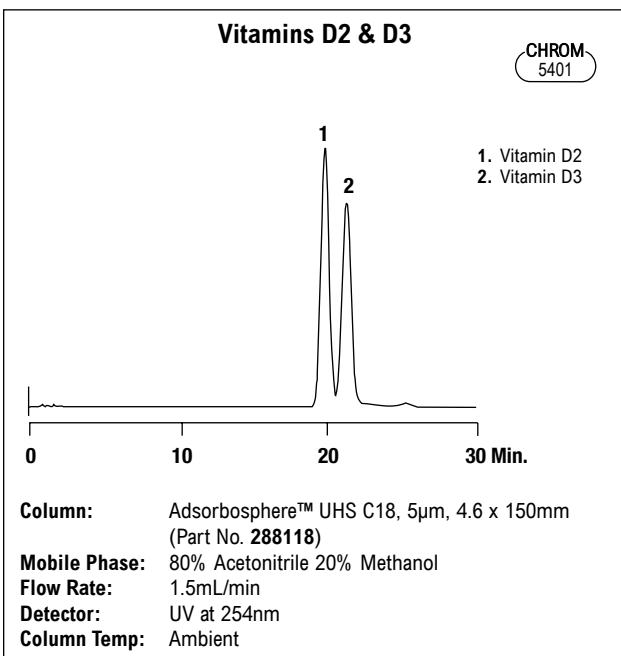
**Adsorbosphere™ UHS** has the largest surface area and highest carbon load for the highest resolution of hydrophobic compounds.

**Adsorbosphere™ XL** is a lower-cost, larger pore alternative. C18-B separates strongly basic analytes more efficiently than standard C18.

hplc columns | small molecule

### Adsorbosphere™ Phase Specifications

Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
Adsorbosphere™ C18	Silica	Spherical	3, 5, 10µm	80Å	200m <sup>2</sup> /g	12%	Monomeric	Yes	L1
Adsorbosphere™ C18 HS	Silica	Spherical	3, 5µm	60Å	350m <sup>2</sup> /g	20%	Monomeric	Yes	L1
Adsorbosphere™ C18 UHS	Silica	Spherical	5, 10µm	60Å	500m <sup>2</sup> /g	30%	Monomeric	Yes	L1
Adsorbosphere™ C8	Silica	Spherical	5µm	80Å	200m <sup>2</sup> /g	8%	Monomeric	Yes	L7
Adsorbosphere™ Phenyl	Silica	Spherical	5µm	80Å	200m <sup>2</sup> /g	5%	Monomeric	Yes	L11
Adsorbosphere™ Cyano	Silica	Spherical	5µm	80Å	200m <sup>2</sup> /g	—	Monomeric	Yes	L10
Adsorbosphere™ Cyano-AQ	Silica	Spherical	5µm	120Å	170m <sup>2</sup> /g	—	Polymeric	No	L10
Adsorbosphere™ Amino (NH <sub>2</sub> )	Silica	Spherical	3, 5µm	80Å	200m <sup>2</sup> /g	—	Polymeric	No	L8
Adsorbosphere™ Silica	Silica	Spherical	5µm	80Å	200m <sup>2</sup> /g	—	—	—	L3
Adsorbosphere™ SAX	Silica	Spherical	5µm	80Å	200m <sup>2</sup> /g	—	Monomeric	—	—
Adsorbosphere™ SCX	Silica	Spherical	5µm	80Å	200m <sup>2</sup> /g	—	Monomeric	Yes	—
Adsorbosphere™ XL C18	Silica	Spherical	3, 5µm	90Å	200m <sup>2</sup> /g	11%	Monomeric	Yes	L1
Adsorbosphere™ XL C18-B	Silica	Spherical	5µm	90Å	200m <sup>2</sup> /g	12%	Monomeric	Yes	L1
Adsorbosphere™ XL C8	Silica	Spherical	3, 5µm	90Å	200m <sup>2</sup> /g	6%	Monomeric	Yes	L7
Adsorbosphere™ XL C1 (TMS)	Silica	Spherical	5µm	90Å	200m <sup>2</sup> /g	—	Monomeric	Yes	L13
Adsorbosphere™ XL Silica	Silica	Spherical	5µm	90Å	200m <sup>2</sup> /g	—	—	—	L3
Adsorbosphere™ XL SAX	Silica	Spherical	5, 10µm	90Å	200m <sup>2</sup> /g	—	Monomeric	Yes	—
Adsorbosphere™ XL SCX	Silica	Spherical	5, 10µm	90Å	200m <sup>2</sup> /g	—	Monomeric	Yes	—



### Adsorbosphere™ HPLC Columns

Packing	Format	i.d. x Length	Standard Part No.	Waters® Fittings Part No.
C18, 3µm	Analytical	4.6 x 100mm	287092	287093
	Rocket™	7 x 33mm	50623	—
	Rocket™	7 x 53mm	50625	—
C18, 5µm	Analytical	4.6 x 150mm	287072	287073
	Analytical	4.6 x 250mm	287062	287063
C18, 10µm	Analytical	4.6 x 250mm	287052	287053
C8, 5µm	Analytical	4.6 x 150mm	287122	287123
	Analytical	4.6 x 250mm	287112	287113
Phenyl, 5µm	Analytical	4.6 x 150mm	287532	287533
	Analytical	4.6 x 250mm	287542	287543
Cyano, 5µm	Analytical	4.6 x 150mm	287202	287203
Cyano-AQ, 5µm	Analytical	4.6 x 150mm	50005	50035
	Analytical	4.6 x 250mm	500050	500060
Amino, 3µm	Analytical	4.6 x 150mm	287282	287283
Amino, 5µm	Analytical	4.6 x 250mm	287242	287243
Silica, 5µm	Analytical	4.6 x 250mm	287012	287013
SAX, 5µm	Analytical	4.6 x 250mm	287512	287513
SCX, 5µm	Analytical	4.6 x 250mm	287472	287473

### Adsorbosphere™ HS HPLC Columns

Packing	Format	i.d. x Length	Standard Part No.	Waters® Fittings Part No.
C18 HS, 3µm	Analytical	4.6 x 100mm	28780	28781
	Analytical	4.6 x 150mm	28786	28787
C18 HS, 5µm	Analytical	4.6 x 150mm	28817	28818
	Analytical	4.6 x 250mm	28821	28822

## Alltech® Adsorbosphere™ Columns (continued)

### Adsorbosphere™ UHS HPLC Columns

Packing	Format	i.d. x Length	Standard Part No.	Waters® Fittings Part No.
<i>C18 UHS, 5µm</i>	Analytical	4.6 x 150mm	<b>288118</b>	<b>288119</b>
<i>C18 UHS, 10µm</i>	Analytical	4.6 x 250mm	<b>288133</b>	<b>288134</b>

### Adsorbosphere™ XL HPLC Columns

Packing	Format	i.d. x Length	Standard Part No.	Waters® Fittings Part No.
<i>XL C18, 3µm</i>	Analytical	4.6 x 100mm	<b>20237</b>	<b>20286</b>
	Analytical	4.6 x 150mm	<b>20381</b>	<b>20394</b>
	Rocket™	7 x 33mm	<b>50633</b>	—
	Rocket™	7 x 53mm	<b>50635</b>	—
<i>XL C18, 5µm</i>	Analytical	4.6 x 150mm	<b>20390</b>	<b>20462</b>
	Analytical	4.6 x 250mm	<b>20552</b>	<b>20579</b>
<i>XL C18-B, 5µm</i>	Analytical	4.6 x 150mm	<b>20548</b>	<b>20344</b>
	Analytical	4.6 x 250mm	<b>20247</b>	<b>20627</b>
<i>XL C8, 3µm</i>	Analytical	4.6 x 150mm	<b>20320</b>	<b>20203</b>
<i>XL C8, 5µm</i>	Analytical	4.6 x 150mm	<b>20676</b>	<b>20607</b>
	Analytical	4.6 x 250mm	<b>20383</b>	<b>20460</b>
<i>XL C1, 5µm</i>	Analytical	4.6 x 150mm	<b>20386</b>	<b>20452</b>
	Analytical	4.6 x 250mm	<b>20628</b>	<b>20636</b>
<i>XL Silica, 5µm</i>	Analytical	4.6 x 150mm	<b>20365</b>	<b>20398</b>
	Analytical	4.6 x 250mm	<b>20256</b>	<b>20654</b>
<i>XL SAX, 5µm</i>	Analytical	4.6 x 150mm	<b>20538</b>	<b>20318</b>
	Analytical	4.6 x 250mm	<b>20550</b>	<b>20561</b>
<i>XL SAX, 10µm</i>	Analytical	4.6 x 250mm	<b>20314</b>	<b>20303</b>
<i>XL SCX, 5µm</i>	Analytical	4.6 x 150mm	<b>20525</b>	<b>20531</b>
	Analytical	4.6 x 250mm	<b>20545</b>	<b>20564</b>
<i>XL SCX, 10µm</i>	Analytical	4.6 x 250mm	<b>20719</b>	<b>20684</b>

### Adsorbosphere™ All-Guard™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
<i>Amino, 5µm</i>	4.6 x 7.5mm	3	<b>96044</b>
<i>C18, 5µm</i>	4.6 x 7.5mm	3	<b>96041</b>
<i>C18 HS, 5µm</i>	4.6 x 7.5mm	3	<b>96079</b>
<i>C18 UHS, 5µm</i>	4.6 x 7.5mm	3	<b>82181</b>
<i>C8, 5µm</i>	4.6 x 7.5mm	3	<b>96042</b>
<i>Cyano, 5µm</i>	4.6 x 7.5mm	3	<b>96047</b>
<i>Cyano-AQ, 5µm</i>	4.6 x 7.5mm	3	<b>96048</b>
<i>Phenyl, 5µm</i>	4.6 x 7.5mm	3	<b>96045</b>
<i>Silica, 5µm</i>	4.6 x 7.5mm	3	<b>96046</b>
<i>SAX, 5µm</i>	4.6 x 7.5mm	3	<b>96049</b>
<i>SCX, 5µm</i>	4.6 x 7.5mm	3	<b>96075</b>
<i>XL C18, 5µm</i>	4.6 x 7.5mm	3	<b>96088</b>
<i>XL C18-B, 5µm</i>	4.6 x 7.5mm	3	<b>96089</b>
<i>XL C8, 5µm</i>	4.6 x 7.5mm	3	<b>96090</b>
<i>XL C1, 5µm</i>	4.6 x 7.5mm	3	<b>96093</b>
<i>XL Silica, 5µm</i>	4.6 x 7.5mm	3	<b>96097</b>
<i>XL SAX, 5µm</i>	4.6 x 7.5mm	3	<b>96098</b>
<i>XL SCX, 5µm</i>	4.6 x 7.5mm	3	<b>96099</b>
<i>All-Guard™ Cartridge Holder</i> (Includes Direct-Connect Column Coupler)		ea	<b>80101</b>

\*All-Guard™ holder required. Other particle sizes available.

### more info

Looking for Adsorbosil® columns?

Please visit [www.discoverysciences.com](http://www.discoverysciences.com).

## Alltech® Allsphere™ Columns

Try Alltech's lower cost Allsphere™ columns as a replacement for Spherisorb® columns. If you are not satisfied with Allsphere™ as a direct replacement for your Spherisorb® applications, we will refund your money.

### Allsphere™ HPLC Columns

Packing	i.d. x Length	Standard Part No.	Waters® Fittings Part No.
<i>ODS-1, 5µm</i>	4.6 x 150mm	<b>778441</b>	<b>778443</b>
	4.6 x 250mm	<b>778364</b>	<b>778357</b>
<i>ODS-2, 3µm</i>	4.6 x 100mm	<b>778487</b>	<b>778489</b>
	4.6 x 150mm	<b>778558</b>	<b>778560</b>
<i>ODS-2, 5µm</i>	4.6 x 150mm	<b>778545</b>	<b>778547</b>
	4.6 x 250mm	<b>778736</b>	<b>778738</b>
<i>C8, 3µm</i>	4.6 x 100mm	<b>778561</b>	<b>778563</b>
	4.6 x 150mm	<b>778609</b>	<b>778611</b>
<i>C8, 5µm</i>	4.6 x 150mm	<b>778571</b>	<b>778573</b>
	4.6 x 250mm	<b>778744</b>	<b>778746</b>
<i>C6, 5µm</i>	4.6 x 150mm	<b>778211</b>	<b>778217</b>
	4.6 x 250mm	<b>778223</b>	<b>778224</b>
<i>Phenyl, 5µm</i>	4.6 x 150mm	<b>778689</b>	<b>778691</b>
	4.6 x 250mm	<b>778752</b>	<b>778754</b>
<i>Cyano, 5µm</i>	4.6 x 150mm	<b>778713</b>	<b>778715</b>
	4.6 x 250mm	<b>778361</b>	<b>778362</b>
<i>Amino, 5µm</i>	4.6 x 150mm	<b>778739</b>	<b>778741</b>
	4.6 x 250mm	<b>778371</b>	<b>778372</b>
<i>Silica, 3µm</i>	4.6 x 100mm	<b>778382</b>	<b>778383</b>
	4.6 x 150mm	<b>778554</b>	<b>778556</b>
<i>Silica, 5µm</i>	4.6 x 150mm	<b>778389</b>	<b>778391</b>
	4.6 x 250mm	<b>778376</b>	<b>778377</b>
<i>SAX, 5µm</i>	4.6 x 250mm	<b>778765</b>	<b>778767</b>
<i>SCX, 5µm</i>	4.6 x 250mm	<b>778188</b>	<b>778189</b>

### Allsphere™ All-Guard™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
<i>ODS-1, 5µm</i>	4.6 x 7.5mm	3	<b>96402</b>
<i>ODS-2, 5µm</i>	4.6 x 7.5mm	3	<b>96403</b>
<i>C8, 5µm</i>	4.6 x 7.5mm	3	<b>96404</b>
<i>C6, 5µm</i>	4.6 x 7.5mm	3	<b>96405</b>
<i>Phenyl, 5µm</i>	4.6 x 7.5mm	3	<b>96406</b>
<i>Cyano, 5µm</i>	4.6 x 7.5mm	3	<b>96408</b>
<i>Amino, 5µm</i>	4.6 x 7.5mm	3	<b>96409</b>
<i>Silica, 5µm</i>	4.6 x 7.5mm	3	<b>96401</b>
<i>SAX, 5µm</i>	4.6 x 7.5mm	3	<b>96410</b>
<i>SCX, 5µm</i>	4.6 x 7.5mm	3	<b>96411</b>
<i>All-Guard™ Cartridge Holder</i> (Includes Direct-Connect Column Coupler)		ea	<b>80101</b>

\*All-Guard™ holder required. Other particle sizes available.

# Grom™ Sil Columns



## High-Quality, Wide Variety, HPLC Columns for All Types of Applications

- Highly consistent manufacturing for excellent reproducibility
- 40 different phases to choose from, general purpose to specialty phases
- Wide range of particle sizes from sub 2µm to 10µm
- Available in nano to preparative column formats

High purity spherical silica with high and universal selectivity for broad range of applications. Different phases and bonding technologies give you the power and flexibility

ST = standard bonding with endcapping—high-quality universal column

NE = not endcapped—high polar selectivity

HE = hydrophilic endcapping—increased polar selectivity; pH-stable at high pH, high carbon load and very low silanol activity

CP = possibility to work at high pH

FE = Fully endcapped—maximum silica coverage

PA = Cross-linked polyamino—better stability

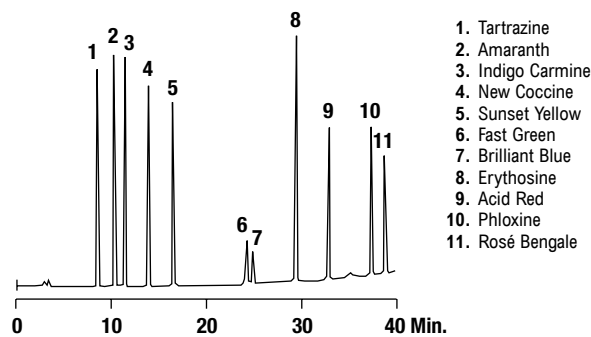
pH = pH stable—use mobile phases up to pH 11

### Grom™ Sil Phase Specifications

Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	End-capped?	USP L-code
ODS-3 CP (encapsulated)	Silica	Spherical	3, 5, 7, 10µm	120, 300Å	320, 170m <sup>2</sup> /g	15, 6%	Polymeric	No	L1
ODS-4 HE (hydrophilic endcapping)	Silica	Spherical	3, 4, 5, 7, 10µm	120, 200Å	300, 200m <sup>2</sup> /g	16, 11%	Monomeric	Yes	L1
ODS-5 ST (standard)	Silica	Spherical	3, 4, 5, 7, 10µm	60, 120, 200Å	580, 300, 200m <sup>2</sup> /g	22, 17, 12%	Monomeric	Yes	L1
ODS-7 pH (pH-stable)	Silica	Irregular	4µm	80Å	510m <sup>2</sup> /g	22%	Polymeric	No	L1
Octyl-5 CP (encapsulated)	Silica	Spherical	3, 5, 7, 10µm	120, 300Å	320, 170m <sup>2</sup> /g	10, 5.5%	Polymeric	No	L7
Phenyl-1 FE (fully endcapped)	Silica	Spherical	3, 5, 10µm	120, 300Å	300, 150m <sup>2</sup> /g	9, 5%	Monomeric	Yes	L11
Phenyl-2 CP (encapsulated)	Silica	Irregular	5µm	120, 300Å	320, 170m <sup>2</sup> /g	7, 4%	Polymeric	No	L11
Cyano-3 CP (encapsulated)	Silica	Spherical	5µm	120Å	320m <sup>2</sup> /g	4%	Polymeric	No	—
Amino-2 PA (Crs linked Poly-NH)	Silica	Spherical	5µm	120Å	300m <sup>2</sup> /g	—	Polymeric	No	L8
Diol	Silica	Spherical	5, 10µm	60, 120, 200Å	580, 300, 200m <sup>2</sup> /g	—	Monomeric	No	L20

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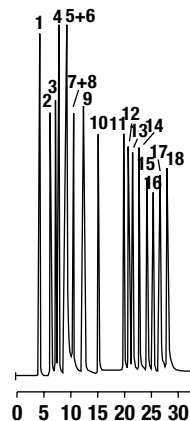
### Color Additives—Dyes



1. Tartrazine
2. Amaranth
3. Indigo Carmine
4. New Coccine
5. Sunset Yellow
6. Fast Green
7. Brilliant Blue
8. Erythrosine
9. Acid Red
10. Phloxine
11. Rosé Bengale

**Column:** Grom™ Sil 120 ODS-5 ST, 5µm, 4 x 150mm  
**Flow Rate:** 0.8mL/min  
**Mobile Phase:** A: 10mM NH<sub>4</sub>-phosphate, pH 6.0:MeOH (90:10)  
 B: 10mM NH<sub>4</sub>-phosphate, pH 6.0:MeOH (20:30)  
**Gradient:** 0–100% B (0–40min, linear), 100% B (40–60min)  
**Column Temp:** 30°C  
**Detector:** UV at 254nm

### Nucleosides and Bases



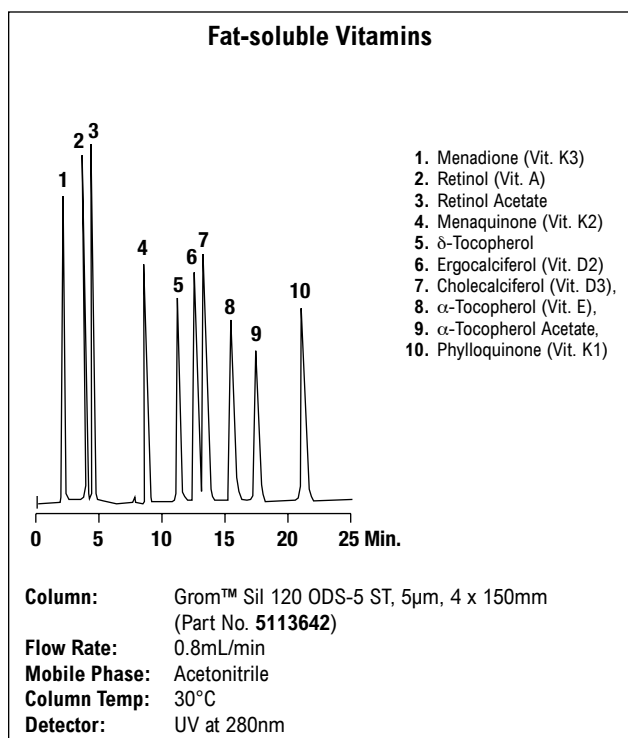
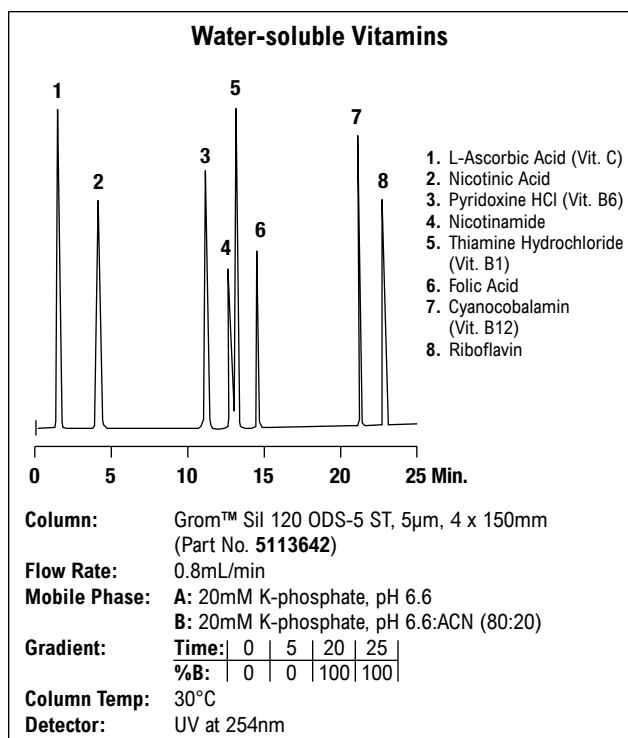
1. Cytosine
2. Cytidine
3. Uracil
4. Deoxycytidine
5. Guanine
6. Adenine
7. Hypoxanthine
8. Uridine
9. Xanthine
10. Thymine
11. Inosine
12. Guanosine
13. Deoxyinosine
14. Deoxyguanosine
15. Xanthosine
16. Thymidine
17. Adenosine
18. Deoxyadenosine

**Column:** Grom™ Sil 120 ODS-5 ST, 5µm, 4 x 250mm  
**Flow Rate:** 0.5mL/min  
**Mobile Phase:** A: 20mM NH<sub>4</sub>-acetate, pH 3.5  
 B: 20mM NH<sub>4</sub>-acetate, pH 3.5:MeOH (90:10)  
**Gradient:**

Time:	0	5	13	40
%B:	30	30	100	100

  
**Detector:** UV at 260nm, 0.08 AUFS

## Grom™ Sil Columns



## more applications

To view our complete searchable chromatogram database visit [www.discoverysciences.com/chromdb/](http://www.discoverysciences.com/chromdb/)



## Grom™ Sil Columns

Packing	Format	i.d. x Length	Part No.	
ODS-3 CP, 3 $\mu$ m	Microbore	1 x 60mm	5115722	
	Microbore	2 x 125mm	5115672	
	Microbore	2 x 250mm	5117056	
	Solvent Reducer	3 x 60mm	5113597	
	Solvent Reducer	3 x 100mm	5117398	
	Solvent Reducer	3 x 150mm	5113602	
	Analytical	4 x 60mm	5113598	
	Analytical	4.6 x 150mm	5117003	
ODS-3 CP, 5 $\mu$ m	Solvent Reducer	3 x 125mm	5113604	
	Analytical	4 x 125mm	5115479	
ODS-4 HE, 10 $\mu$ m	Analytical	4.6 x 250mm	5116144	
ODS-4 HE, 3 $\mu$ m	Capillary	0.3 x 150mm	5118148	
	Microbore	1 x 50mm	5116060	
	Microbore	1 x 150mm	5113619	
	Microbore	2 x 100mm	5115975	
	Microbore	2 x 125mm	5116880	
	Microbore	2 x 150mm	5114808	
	Analytical	4 x 50mm	5118892	
	Analytical	4 x 60mm	5117386	
	Analytical	4 x 125mm	5113618	
	Analytical	4.6 x 125mm	5117572	
	ODS-4 HE, 5 $\mu$ m	Capillary	0.1 x 150mm	5117667
		Capillary	0.2 x 250mm	5119092
		Capillary	0.5 x 250mm	5118525
		Microbore	2 x 125mm	5113623
		Microbore	2 x 150mm	5116012
	Solvent Reducer	3 x 150mm	5117727	
Analytical	4 x 125mm	5115808		
Analytical	4 x 250mm	5113626		
Analytical	4.6 x 150mm	5116777		
ODS-5 ST, 3 $\mu$ m	Microbore	2 x 60 mm	5117044	
	Microbore	2 x 150mm	5118335	
ODS-5 ST, 5 $\mu$ m	Microbore	2 x 250mm	5116342	
	Analytical	4 x 125mm	5116219	
	Analytical	4 x 150mm	5113642	
	Analytical	4 x 250mm	5113646	
ODS-7 pH, 4 $\mu$ m	Analytical	4.6 x 250mm	5113647	
	Capillary	0.3 x 250mm + 10mm Guard Column	5119756	
Microbore	Microbore	1 x 50mm	5118213	
	Microbore	2 x 40mm	5115266	
	Solvent Reducer	3 x 150mm	5116956	
	Analytical	4.6 x 125mm	5113654	
Octyl-5 HE, 3 $\mu$ m	Analytical	4.6 x 150mm	5115840	
	Analytical	4.6 x 125mm	5113265	
Octyl-5 CP, 5 $\mu$ m	Microbore	2 x 250mm	5117325	
	Analytical	4 x 150mm	5117565	
Phenyl-1 FE, 5 $\mu$ m	Microbore	2 x 100mm	5113695	
	Analytical	4 x 250mm	5113696	
Phenyl-2 CP, 5 $\mu$ m	Analytical	4 x 250mm	5116429	
	Cyano-3 CP, 5 $\mu$ m	Microbore	2 x 125mm	5117410
Analytical		4.6 x 60mm	5116441	
Amino-2 PA, 5 $\mu$ m	Microbore	2 x 250mm	5115469	
	Analytical	4 x 250mm	5113466	
	Analytical	4.6 x 250mm	5115306	
Diol, 5 $\mu$ m	Microbore	2 x 100mm	5117476	

## more info

For large molecule columns, refer to page 84–97.

# Grom™ Sapphire Column



## High Purity for Optimal Performance of Challenging Separations

- Excellent peak shape—Highly symmetrical peaks from high purity silica base
- High speed and high capacity—Range of pore sizes and surface area for improved speed
- Optimized for consistent flow—critical in low volume applications
- Variety of column formats—1.5, 3, and 5µm particles

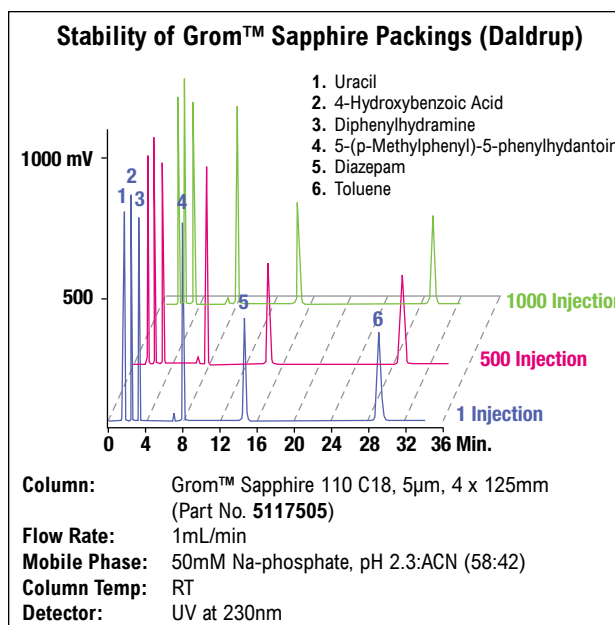
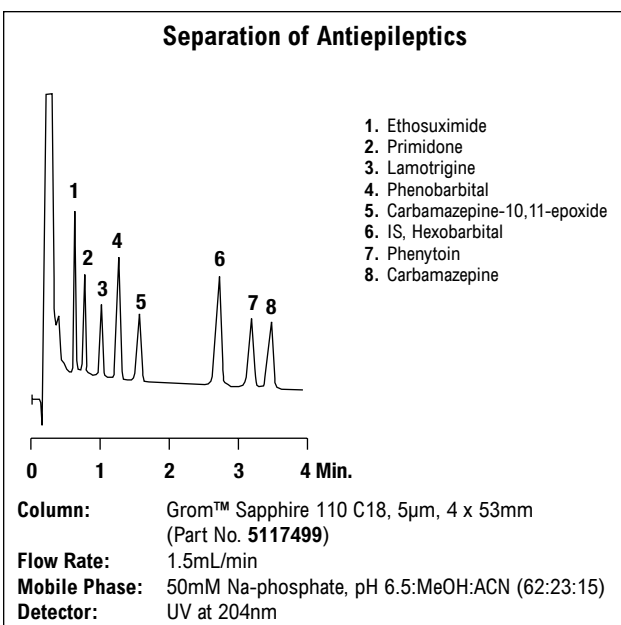


hplc columns | small molecule

### Sapphire Phase Specifications

Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
C18	Silica	Spherical	3, 5, 10µm	65, 110Å	500, 270m <sup>2</sup> /g	23, 16%	Monomeric	Yes	L1
C8	Silica	Spherical	3, 5, 10µm	65, 110Å	500, 270m <sup>2</sup> /g	15, 10%	Monomeric	Yes	L7
C4*	Silica	Spherical	3, 5, 10µm	65, 110Å	500, 270m <sup>2</sup> /g	10.5, 7%	Monomeric	Yes	L26
Silica*	Silica	Spherical	3, 5, 10µm	65, 110Å	500, 270m <sup>2</sup> /g	—	—	No	L3

\*Columns available upon request.



### Sapphire HPLC Columns

Packing	i.d. x Length	Part No.
C18, 3µm	0.030 x 150mm	5119303
	0.075 x 150mm	5133239
	0.100 x 100mm	5135280
C18, 5µm	4 x 53mm	5117499
	4 x 125mm	5117505
C8, 5µm	2 x 250mm	5118934

### related products

Looking for HPLC column prefilers? See page 111.



### technical assistance

Contact Tech Support: Phone: 1.800.255.8324 (North America)  
 Email: [contact.alltech@grace.com](mailto:contact.alltech@grace.com)  
 Online: [www.discoverysciences.com](http://www.discoverysciences.com)

### related products

Need high-pressure polymeric fittings? See pages 112–114 for our full selection of high-pressure fittings.

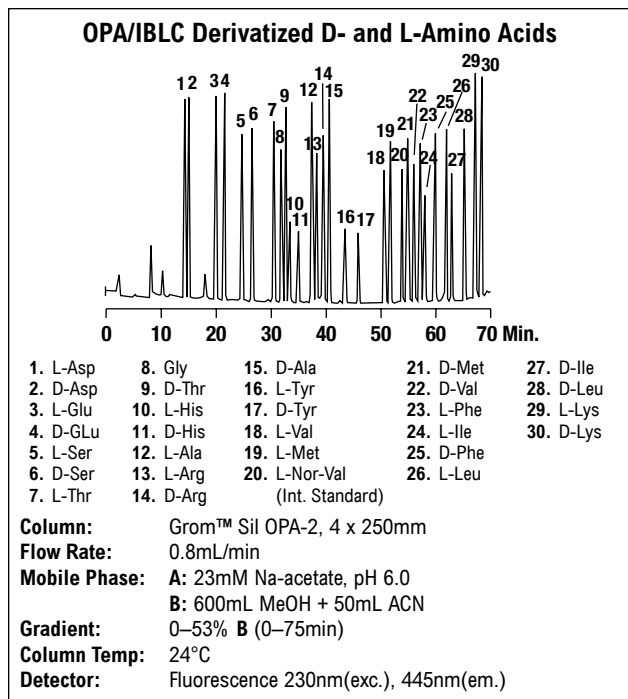


6673

# Grom™ Amino Acid Column Kits

## Amino Acid Analysis by Precolumn Derivatization Using OPA/IBLC

- High resolution (both optical antipodes of all protein amino acids in a single chromatogram)
- Outstandingly high sensitivity (fMol)
- Extraordinarily long lifetimes of columns

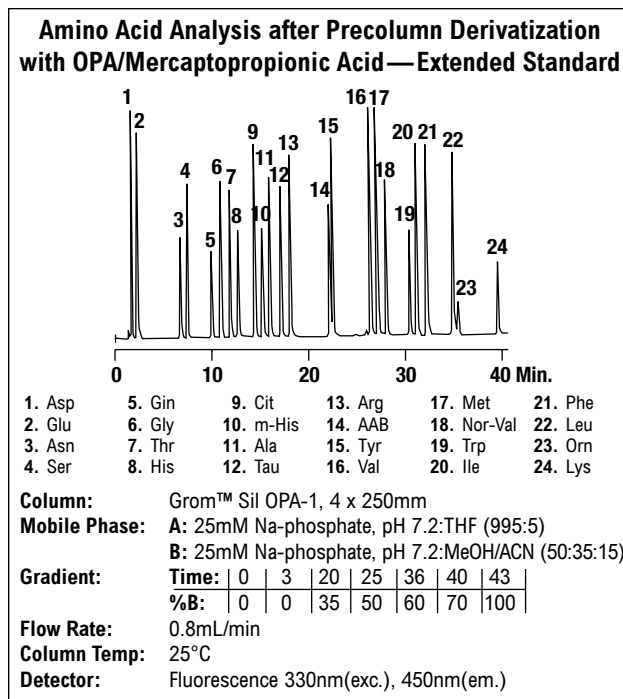


### OPA/IBLC Kit

Description	Part No.
Complete kit includes 4.0mm i.d. x 250mm length column, OPA/IBLC derivatization reagents, and detailed working instructions.	987.0000

## Amino Acid Analysis by Precolumn Derivatization With OPA/3-MPA

- Highest sensitivity (5–10fMol)
- Short analysis time
- Fully automated derivatization
- Best resolution



### OPA/3-MPA Kit

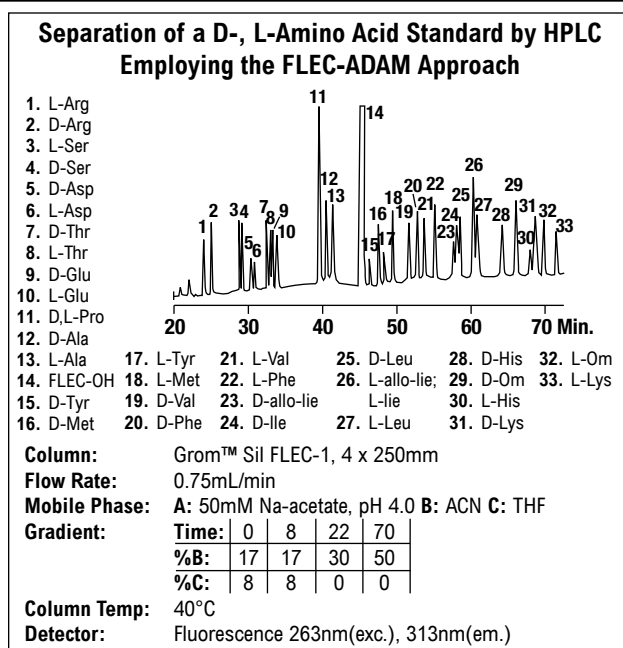
Description	Part No.
Complete kit includes 4.6mm i.d. x 150mm length column, OPA/3-MPA derivatization reagents, and detailed working instructions.	980.0000

## Amino Acid Analysis by Precolumn Derivatization Using FLEC/ADAM

- High resolution and high sensitivity
- Rapid, automated or manual derivatization
- Primary and secondary amines
- Stable derivatives

### FLEC/ADAM Kit

Description	Part No.
Complete kit includes 4.0mm i.d. x 250mm length column, FLEC/ADAM derivatization reagents, and detailed working instructions.	984.0000





# Jones Genesis® Columns

Genesis® columns use a new generation adsorbent based on high-purity metal-free 120Å spherical silica. Particle size offering includes 3, 4, 7, and 15µm. Genesis® columns exhibit excellent peak symmetry and exceptional pH stability from 1 to 10.

**JONES**



hplc columns | small molecule

### Genesis® Phase Specifications

Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
C18	Silica	Spherical	3, 4, 7, 15µm	120Å	300m <sup>2</sup> /g	18%	Monomeric	Yes	L1
AQ	Silica	Spherical	4, 7µm	120Å	300m <sup>2</sup> /g	15%	Monomeric	Yes	L1
C8	Silica	Spherical	3, 4, 7, 15µm	120Å	300m <sup>2</sup> /g	11%	Monomeric	No	L7
C8e/c	Silica	Spherical	3, 4, 7, 15µm	120Å	300m <sup>2</sup> /g	11%	Monomeric	Yes	L7
C4	Silica	Spherical	4µm	120Å	300m <sup>2</sup> /g	6.3%	Monomeric	Yes	L26
Phe	Silica	Spherical	4µm	120Å	300m <sup>2</sup> /g	9.4%	Monomeric	Yes	L11
CN	Silica	Spherical	3, 4µm	120Å	300m <sup>2</sup> /g	7%	Monomeric	Yes	L10
Amino (NH <sub>2</sub> )	Silica	Spherical	3, 4µm	120Å	300m <sup>2</sup> /g	3.5%	Polymeric	No	L8
Carbohydrate	Silica	Spherical	4µm	120Å	300m <sup>2</sup> /g	—	Monomeric	—	—
CN-TCA	Silica	Spherical	4µm	120Å	300m <sup>2</sup> /g	7%	Monomeric	Yes	—
Petro-XP	Silica	Spherical	4µm	120Å	300m <sup>2</sup> /g	—	Monomeric	—	—
Silica	Silica	Spherical	3, 4, 7, 15µm	120Å	300m <sup>2</sup> /g	n/a	n/a	n/a	L3

### Genesis® C18 Reversed Phase

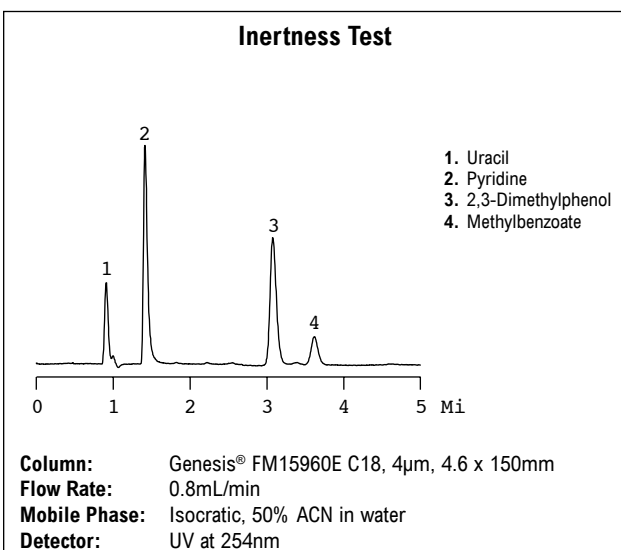
- Excellent peak symmetry
- Exceptional stability from pH 1 to 10
- Reduced need for mobile-phase modifiers
- Long column life

Genesis® C18 bonding is monomeric. A unique proprietary end-capping reagent, which is less prone to acid hydrolysis than trimethylsilane, provides freedom from residual silanols and enhanced stability under low-pH operating conditions. Genesis® C18 columns also exhibit superior stability at alkaline pH. The permissible operating range is pH 1–10.

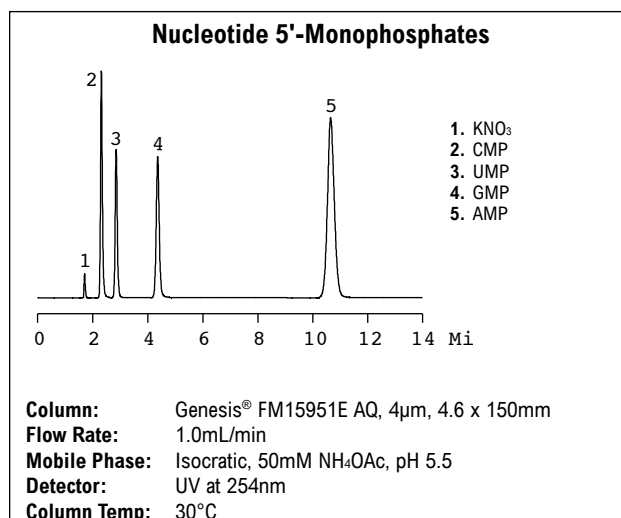
### Genesis® AQ Reversed Phase

- Designed for separating hydrophilic and polar compounds
- Stable retention times in 100% aqueous mobile phases
- Rapid equilibration
- Unique reversed-phase selectivity

The Genesis® AQ adsorbent employs an optimum ratio of C18, short (non-TMS) chains, and polar surface groups bonded to high-purity 120Å silica to allow rapid equilibration and provide consistent, reproducible chromatography with stable retention times in 100% aqueous eluents.



Retention on Genesis® AQ is greater for polar analytes but lower for non-polar compounds compared to Genesis® C18. Uracil, which is typically an unretained peak on C18 columns, is well retained on the Genesis® AQ adsorbent. Acids and bases exhibit good peak shapes. Although Genesis® AQ excels with water-rich mobile phases, it can also be used in gradient and isocratic modes with a full spectrum of mobile phases.



# Jones Genesis® Columns

## Genesis® C8(EC) Reversed Phase

- Excellent peak symmetry
- Exceptional stability from pH 1 to 10
- Reduced need for mobile-phase modifiers
- Long column life

C8(EC) is double-bonded before fully endcapped using a unique proprietary end-capping reagent. It is less prone to acid hydrolysis than trimethylsilane, which provides freedom from residual silanols and enhanced stability under low-pH operating conditions. The bonding is monomeric. Genesis® C8(EC) columns exhibit superior stability at alkaline pH.

## Genesis® C8 Reversed Phase

- Non-endcapped
- Suitable for lower pH separations

Genesis® C8 bonding is monomeric. They are suitable for separations under lower pH conditions and may offer selectivity advantages for some samples.

## Genesis® Phenyl

- Unique reversed-phase chemistry
- Improve the chromatography of polar aromatic, fatty acids, and basic pharmaceuticals

Genesis® Phenyl columns provide impressive peak symmetry for both acidic and basic compounds.

Genesis® Columns					Genesis® Guards <sup>1</sup>				
Length:	30mm	50mm	100mm	150mm	200mm	250mm	10mm	20mm	
<b>Genesis® AQ</b>									
<i>4μm</i>	1.0mm i.d.	—	FJ5951E	FJ10951E	FJ15951E	—	FJ25951E	FJ1951-2	—
	2.1mm i.d.	FK3951E	FK5951E	FK10951E	FK15951E	FK20951E	FK25951E	FK1951-2	FK2951-2
	3.0mm i.d.	FL3951E	FL5951E	FL10951E	FL15951E	—	FL25951E	FL1951-2	FL2951-2
	4.0mm i.d.	FH3951E	FH5951E	FH10951E	FH15951E	—	FH25951E	FH1951-2	FH2951-2
	4.6mm i.d.	FM3951E	FM5951E	FM10951E	FM15951E	FM20951E	FM25951E	—	—
<b>Genesis® C18</b>									
<i>3μm</i>	1.0mm i.d.	—	FJ5963E	FJ10963E	FJ15963E	—	FJ25963E	FJ1963-2	—
	2.1mm i.d.	FK3963E	FK5963E	FK10963E	FK15963E	FK20963E	FK25963E	FK1963-2	FK2963-2
	3.0mm i.d.	FL3963E	FL5963E	FL10963E	FL15963E	—	FL25963E	—	—
	4.0mm i.d.	FH3963E	FH5963E	FH10963E	FH15963E	—	FH25963E	FH1963-2	FH2963-2
	4.6mm i.d.	FM3963E	FM5963E	FM10963E	FM15963E	FM20963E	FM25963E	—	—
<i>4μm</i>	1.0mm i.d.	—	FJ5960E	FJ10960E	FJ15960E	—	FJ25960E	FJ1960-2	—
	2.1mm i.d.	FK3960E	FK5960E	FK10960E	FK15960E	FK20960E	FK25960E	FK1960-2	FK2960-2
	3.0mm i.d.	FL3960E	FL5960E	FL10960E	FL15960E	—	FL25960E	FL1960-2	FL2960-2
	4.0mm i.d.	FH3960E	FH5960E	FH10960E	FH15960E	—	FH25960E	FH1960-2	FH2960-2
	4.6mm i.d.	FM3960E	FM5960E	FM10960E	FM15960E	FM20960E	FM25960E	—	—
<b>Genesis® C8</b>									
<i>3μm</i>	1.0mm i.d.	—	FJ5968E	FJ10968E	FJ15968E	—	FJ25968E	FJ1968-2	—
	2.1mm i.d.	FK3968E	FK5968E	FK10968E	FK15968E	FK20968E	FK25968E	FK1968-2	FK2968-2
	3.0mm i.d.	FL3968E	FL5968E	FL10968E	FL15968E	—	FL25968E	FL1968-2	FL2968-2
	4.0mm i.d.	FH3968E	FH5968E	FH10968E	FH15968E	—	FH25968E	FH1968-2	FH2968-2
<i>4μm</i>	1.0mm i.d.	—	FJ5962E	FJ10962E	FJ15962E	—	FJ25962E	FJ1962-2	—
	2.1mm i.d.	FK3962E	FK5962E	FK10962E	FK15962E	FK20962E	FK25962E	FK1962-2	FK2962-2
	3.0mm i.d.	FL3962E	FL5962E	FL10962E	FL15962E	—	FL25962E	FL1962-2	FL2962-2
	4.0mm i.d.	FH3962E	FH5962E	FH10962E	FH15962E	—	FH25962E	FH1962-2	FH2962-2
4.6mm i.d.	FM3962E	FM5962E	FM10962E	FM15962E	FM20962E	FM25962E	—	—	
<b>Genesis® C8(EC)</b>									
<i>3μm</i>	1.0mm i.d.	—	FJ5969E	FJ10969E	FJ15969E	—	FJ25969E	FJ1969-2	—
	2.1mm i.d.	FK3969E	FK5969E	FK10969E	FK15969E	FK20969E	FK25969E	FK1969-2	FK2969-2
	3.0mm i.d.	FL3969E	FL5969E	FL10969E	FL15969E	—	FL25969E	FL1969-2	FL2969-2
	4.0mm i.d.	FH3969E	FH5969E	FH10969E	FH15969E	—	FH25969E	FH1969-2	FH2969-2
4.6mm i.d.	FM3969E	FM5969E	FM10969E	FM15969E	FM20969E	FM25969E	—	—	
<i>4μm</i>	1.0mm i.d.	—	FJ5964E	FJ10964E	FJ15964E	—	FJ25964E	FJ1964-2	—
	2.1mm i.d.	FK3964E	FK5964E	FK10964E	FK15964E	FK20964E	FK25964E	FK1964-2	FK2964-2
	3.0mm i.d.	FL3964E	FL5964E	FL10964E	FL15964E	—	FL25964E	FL1964-2	FL2964-2
	4.0mm i.d.	FH3964E	FH5964E	FH10964E	FH15964E	—	FH25964E	FH1964-2	FH2964-2
4.6mm i.d.	FM3964E	FM5964E	FM10964E	FM15964E	FM20964E	FM25964E	—	—	
<b>Genesis® Phenyl</b>									
<i>4μm</i>	1.0mm i.d.	—	FJ5980E	FJ10980E	FJ15980E	—	FJ25980E	FJ1980-2	—
	2.1mm i.d.	FK3980E	FK5980E	FK10980E	FK15980E	FK20980E	FK25980E	FK1980-2	FK2980-2
	4.0mm i.d.	FH3980E	FH5980E	FH10980E	FH15980E	—	FH25980E	FH1980-2	FH2980-2
	4.6mm i.d.	FM3980E	FM5980E	FM10980E	FM15980E	FM20980E	FM25980E	FH1980-2	FH2980-2

NOTE: Genesis® line is completed by additional phases such as Silica, Phenyl, Cyano, and Amino, for details please check online at [www.discoverysciences.com](http://www.discoverysciences.com).  
<sup>1</sup>All Genesis® guards listed are cartridges and require either a stand-alone holder or direct-connect holder for use. Guard cartridges are 2/pk.

### Guard Cartridge Holders for Genesis® and Apex™ Guards

	10 mm Stand-Alone	20 mm Stand-Alone	10 mm Direct-Connect	20 mm Direct-Connect
1.0 mm i.d.	F91GPH	—	—	—
2.1 mm i.d.	F9111P	F9112P	F9141P	—
3.0, 4.0, 4.6 mm i.d.	F9111P	F9112P	F9151P	F9152P

# Jones Apex™ Reversed-Phase Columns



## Economical Column Line with Maximum Reproducibility and Efficiency

- Conventional 100Å pore size spherical silica
- Uniform-sized particle
- Narrow particle distribution
- Controlled surface area



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### Apex™ Phase Specifications

Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
ODS	Silica	Spherical	3, 5, 10µm	100Å	170m <sup>2</sup> /g	10%	Polymeric	Yes	L1
ODS II	Silica	Spherical	3, 5µm	100Å	170m <sup>2</sup> /g	10.5%	Monomeric	Yes	L1
C8	Silica	Spherical	3, 5µm	100Å	170m <sup>2</sup> /g	7%	Monomeric	No	L7
C8(EC)	Silica	Spherical	3, 5µm	100Å	170m <sup>2</sup> /g	7%	Monomeric	Yes	L7
C1	Silica	Spherical	3, 5µm	100Å	170m <sup>2</sup> /g	2.5%	Monomeric	Yes	L13
Diol	Silica	Spherical	3, 5µm	100Å	170m <sup>2</sup> /g	3.5%	Monomeric	No	
Phe	Silica	Spherical	3, 5µm	100Å	170m <sup>2</sup> /g	3%	Monomeric	Yes	L11
CN	Silica	Spherical	3, 5µm	100Å	170m <sup>2</sup> /g	4%	Monomeric	No	L10
Amino (NH <sub>2</sub> )	Silica	Spherical	3, 5µm	100Å	170m <sup>2</sup> /g	2%	Monomeric	No	L8
Amino II (NH <sub>2</sub> )	Silica	Spherical	3, 5µm	100Å	170m <sup>2</sup> /g	2%	Monomeric	No	L8
Carbohydrate	Silica	Spherical	5µm	100Å	170m <sup>2</sup> /g	—	Monomeric	Proprietary	—
Silica	Silica	Spherical	3, 5, 10µm	100Å	170m <sup>2</sup> /g	n/a%	n/a	No	L3

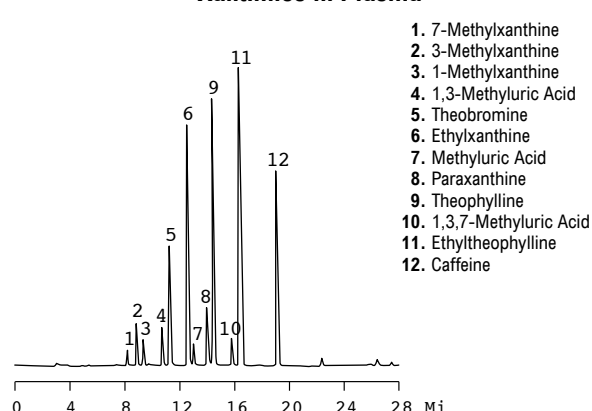
### Apex™ HPLC Columns

Packing	Format	i.d. x Length	Part No.
ODS, 3µm	Analytical	4.6 x 50mm	5110394
	Analytical	4.6 x 30mm	5109740
	Analytical	4.6 x 50mm	5140902
	Analytical	4.6 x 150mm	5140900
	Analytical	4.6 x 250mm	5140901
ODS II, 3µm	Analytical	4.6 x 100mm	5110994
	Analytical	4.6 x 250mm	5111025
ODS II, 5µm	Analytical	4.6 x 50mm	5109944
	Analytical	4.6 x 100mm	5112992
	Analytical	4.6 x 150mm	5109730
C8, 5µm	Analytical	4.6 x 250mm	5109733
	Analytical	4.6 x 30mm	5112351
	Analytical	4.6 x 150mm	5109921
C8(EC), 5µm	Analytical	4.6 x 250mm	5109734
	Analytical	4.6 x 30mm	5112354
Diol, 5µm	Analytical	4.6 x 250mm	5109735
	Analytical	4.6 x 150mm	5120721
Phenyl, 5µm	Analytical	4.6 x 100mm	5110997
	Analytical	4.6 x 150mm	5110650
	Analytical	4.6 x 250mm	5109934
Cyano, 5µm	Analytical	4.6 x 250mm	5109737
Cyano II, 5µm	Analytical	4.6 x 250mm	5109933
Amino, 5µm	Analytical	4.6 x 150mm	5112313
	Analytical	4.6 x 250mm	5111029
Amino II, 3µm	Analytical	4.6 x 150mm	5111004
Silica, 3µm	Analytical	4.6 x 150mm	5109698
Silica, 5µm	Analytical	4.6 x 250mm	5110044
	Analytical	4.6 x 250mm	5111024

### Apex™ Guard Columns

Packings	i.d. x Length	Part No.
ODS, 5µm	4 x 10mm	5110703
ODS II, 5µm	4 x 20mm	5110705
C8, 5µm	4 x 20mm	5112454
C8-EC, 5µm	4 x 10mm	5112425
Cyano, 5µm	4 x 10mm	5111079
Amino, 5µm	4 x 10mm	5111078
	4 x 20mm	5112455
Guard Cartridge Holder	10mm	F9111P
	20mm	F9112P

### Xanthines in Plasma



1. 7-Methylxanthine
2. 3-Methylxanthine
3. 1-Methylxanthine
4. 1,3-Methyluric Acid
5. Theobromine
6. Ethylxanthine
7. Methyluric Acid
8. Paraxanthine
9. Theophylline
10. 1,3,7-Methyluric Acid
11. Ethyltheophylline
12. Caffeine

**Column:** Apex™ ODS II, C18, 5µm, 4.6 x 250mm  
**Flow Rate:** 0.8mL/min  
**Mobile Phase:** A: 10 mM NaOAc, 0.02% THF  
 B: 10 mM NaOAc, 2.7% THF, 25% ACN  
**Gradient:** Time: 0 | 35 |  
 %B: 0 | 70 |  
**Column Temp:** 50°C  
**Detector:** UV at 273nm

### more applications

To view our complete searchable chromatogram database visit [www.discoverysciences.com/chromdb/](http://www.discoverysciences.com/chromdb/)

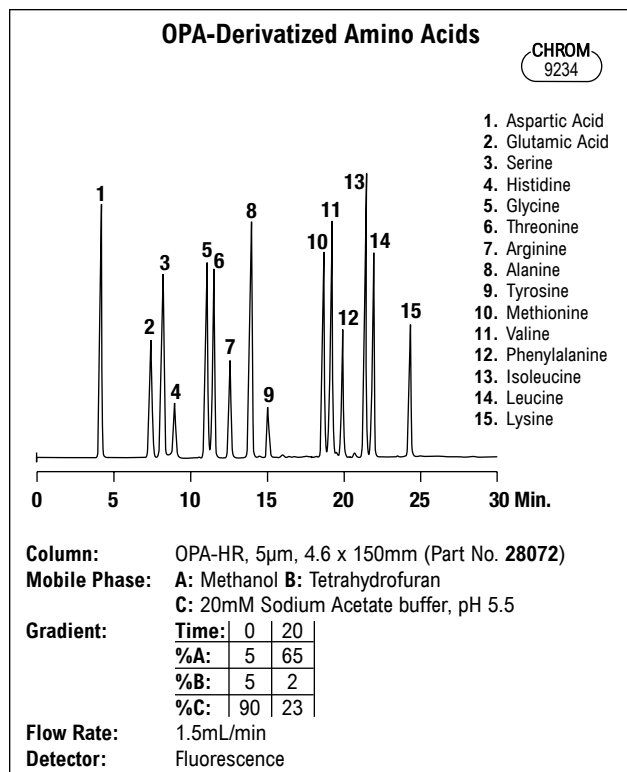


## Alltech® OPA Amino Acid Columns

- OPA-HS for high-speed with protein hydrolysates
- OPA-HR for high-resolution with physiological samples

OPA-HS (high-speed) columns are ideal for the study of protein acid hydrolysates with very simple mobile-phase systems.

OPA-HR (high-resolution) columns are ideal for applications that require more resolution than simple hydrolysates. OPA-HR gives baseline separation of most amino acids found in physiological fluids.



### OPA Amino Acid HPLC Columns

Packing	Format	i.d. x Length	Part No.
OPA-HS, 5 $\mu$ m	Analytical	4.6 x 100mm	28064
OPA-HR, 5 $\mu$ m	Analytical	4.6 x 150mm	28072

### Derivatization Reagents

Description	Qty.	Part No.
OPA Crystals	5g	35606

### more info

For related products, see our Vydac® line of Life Science columns on pages 85–95.



7110

## Alltech® Catecholamine Columns

- For routine analysis of indoles and catecholamines
- Reliable and inexpensive

With this column, easily resolve catecholamines under isocratic conditions at room temperature. A simple monochloroacetic acid mobile phase with varying amounts of sodium octyl sulfate and disodium EDTA controls the elution profile.

### Catecholamine HPLC Columns

Packing	Format	i.d. x Length	Part No.
Catecholamine, 3 $\mu$ m	Analytical	4.6 x 100mm	28916

### All-Guard™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
Catecholamine, 3 $\mu$ m	4.6 x 7.5mm	3	96076
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	80101

\*All-Guard™ holder required.

## Alltech® Nucleotide-Nucleoside Columns

- Determine both nucleotides and nucleosides with a single column

With this column, separate seven common nucleosides or twelve common nucleotides using a buffer/methanol/tetrabutyl ammonium phosphate gradient.

### Nucleotide-Nucleoside HPLC Columns

Packing	Format	i.d. x Length	Part No.
Nucleotide-Nucleoside, 7 $\mu$ m	Analytical	4.6 x 250mm	35623

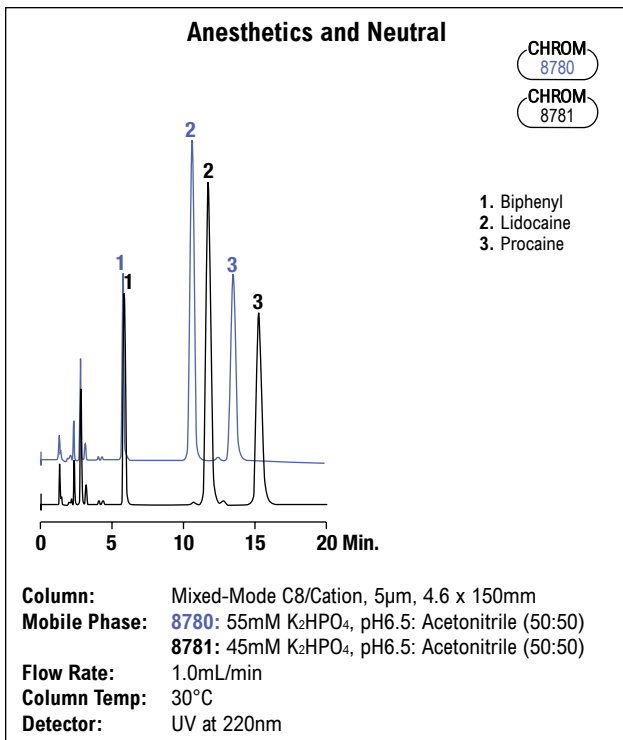
### All-Guard™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
Nucleotide-Nucleoside, 7 $\mu$ m	4.6 x 7.5mm	3	96077
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	80101

\*All-Guard™ holder required.

## Alltech® Mixed-Mode Columns

- Separate hydrophobic and ionic species on a single column
- Control ionization with buffer adjustments instead of ion-pair reagents



Changing the buffer concentration affects the capacity of the cationic components lidocaine and procaine, but does not affect the capacity of biphenyl, a neutral component.

### Mixed-Mode HPLC Columns

Packing	Format	i.d. x Length	Part No.	Waters® Fittings Part No.
C8/Anion, 7µm	Analytical	4.6 x 150mm	71354	71355
	Analytical	4.6 x 250mm	12369	12370
C8/Cation, 5µm	Analytical	4.6 x 150mm	72568	72569
	Analytical	4.6 x 250mm	71364	71365
C18/Cation, 5µm	Analytical	4.6 x 150mm	72574	72575
	Analytical	4.6 x 250mm	71369	71370

### Mixed-Mode All-Guard™ Cartridges\*

Packing, 5µm	i.d. x Length	Qty.	Part No.
C8/Anion	4.6 x 7.5mm	3	96147
C8/Cation	4.6 x 7.5mm	3	71379
C18/Cation	4.6 x 7.5mm	3	71380
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	80101

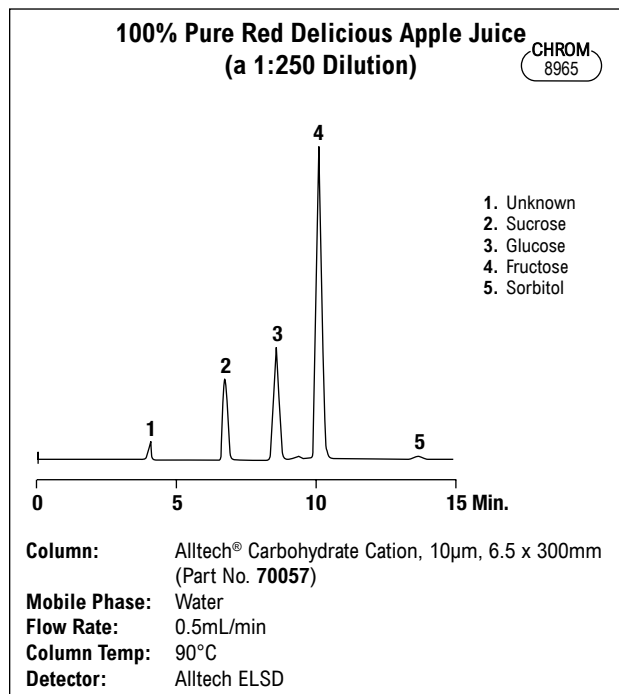
\*All-Guard™ holder required. Other particle sizes available.

## Alltech® Carbohydrate Cation Columns

- High efficiency separations using only water as the mobile phase
- Sulfonated polystyrene resin in the calcium form
- Column heating required



7110



### Carbohydrate Cation HPLC Columns

Packing	Format	i.d. x Length	Part No.
Carbohydrate Cation, 10µm	Analytical	6.5 x 300mm	70057

### Carbohydrate Cation All-Guard™ Cartridges

Packing	i.d. x Length	Qty.	Part No.
Carbohydrate Cation Guard Cartridges	4.6 x 7.5mm	3	96109
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)			80101

\*All-Guard™ holder required.

### more info

For Alltech® Prevail™ Carbohydrate ES columns, see page 47.

### related product

Need a column heater?  
See pages 16 and 17.



6219

### related product

Doing carbohydrate analysis?  
Alltech® 3300 ELSD is more sensitive than RI. See pages 5–10.



6947B

# Vydac® Venture® Immunoaffinity Columns

## Repetitive-Use, Silica-Based Immunoaffinity Columns



6908

Venture® immunoaffinity HPLC columns provide an easy and quick way to purify and concentrate analytes from complex food, environmental, and biological matrices for fast, accurate measurement.

Vydac® Venture® immunoaffinity columns use ICEtech™ (*Inert Coating Enhancement Technology, U.S. Patent No. 6,802,966*) silica processing to eliminate non-specific binding on the silica surface. This enables Venture® columns to be the first affinity matrix to take advantage of silica's rigid porous structure, making direct coupling of the columns with other modes of chromatography, such as reversed-phase HPLC feasible.

Benefits	Features
Rapid Analysis	<ul style="list-style-type: none"> <li>No laborious sample preparation procedures</li> <li>Fast binding kinetics</li> <li>Wide-pore silica support allows on-line direct coupling with HPLC for real time analysis</li> </ul>
Excellent Accuracy and Precision	<ul style="list-style-type: none"> <li>Quantitative recovery of analyte from IAC column</li> <li>High sensitivity due to high volume injection</li> <li>Precision comparable with conventional HPLC methods</li> </ul>
Highly Selective	<ul style="list-style-type: none"> <li>Specially treated wide-pore silica eliminates non-specific interactions</li> <li>Secondary separation reduces errors due to cross reactivity</li> <li>Highly selective antibodies toward target analyte</li> </ul>
Long Column Lifetime	<ul style="list-style-type: none"> <li>Analyze over 200 samples on a single column without column deterioration due to the high ligand stability of the Venture® IAC columns</li> </ul>
Analysis of Difficult Matrices	<ul style="list-style-type: none"> <li>Venture® IAC columns isolate, concentrate and purify targeted sample components from dilute and complex matrices in one step</li> </ul>
Significant Cost Reductions	<ul style="list-style-type: none"> <li>Costs reduced by as much as 90%</li> <li>Long column lifetime decreases material costs to less than \$5.00 per analysis</li> <li>Rapid analysis and automation reduces technician time</li> <li>Significant reduction in solvent use</li> <li>Less solvent waste disposal costs</li> </ul>
Automated Analysis	<ul style="list-style-type: none"> <li>HPLC format allows automation for high sample throughput</li> </ul>

### Venture® Immunoaffinity Columns

Product Name	Target Analyte	i.d. and length	Part No.
<i>Mycotoxins Analysis</i>			
Venture® AF	Aflatoxin	2.1 x 50mm	5120313
Venture® OT	Ochratoxin A	2.1 x 50mm	5135954
<i>Food Nutrient Analysis</i>			
Venture® FA	Folic Acid	2.1 x 50mm	5135952
Venture® B12	Vitamin B <sub>12</sub>	2.1 x 50mm	5120201
Venture® BF	Folic Acid and Vitamin B <sub>12</sub>	2.1 x 50mm	5135951
<i>Acrylamide Analysis</i>			
Venture® AC	Acrylamide	2.1 x 50mm	5135953
<i>Lactoferrin Analysis</i>			
Venture® LTF	Lactoferrin	2.1 x 50mm	5120400
<i>Endocrine Disruptors Analysis</i>			
Venture® EE2	17α-Ethynyl Estradiol	2.1 x 50mm	5120404
Venture® E2	17β-Estradiol	2.1 x 50mm	5120403
Venture® E1	Estrone	2.1 x 50mm	5120405
Venture® BPA	Bisphenol A	2.1 x 50mm	5120406
<i>Pollutants Analysis</i>			
Venture® CPA	Chlorophenoxy Acetic Acid Herbicides	2.1 x 50mm	5120407
Venture® PVH	Phenylurea Herbicides	2.1 x 50mm	5120408
Venture® OPP	Organophosphorous Pesticides	2.1 x 50mm	5120410
Venture® VCZ	Vinclozolin Fungicide	2.1 x 50mm	5120411
<i>Steroid Hormones Analysis</i>			
Venture® TT	Testosterone	2.1 x 50mm	5120401
Venture® NT	Nortestosterone	2.1 x 50mm	5120402

## Vydac® Denali® C18 Reversed Phase

Denali® columns contain a new-generation silica-based 120Å monomeric C18 adsorbent based on the same bonding technology employed in Vydac® Everes® 300Å columns. This new technology improves C18 surface coverage and deactivates residual silanols. Previously, the best monomeric C18 chemistries had carbon coverage in the 2.8 to 3.6µmol/m<sup>2</sup> range. Denali® C18 has coverage in excess of 4µmol/m<sup>2</sup> and approximates the theoretical limit based on surface area.

VYDAC



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### Vydac® Denali® C18 Reversed-Phase 238DE C18

Particle Size	Columns					Recommended Guards	
	i.d.	50mm	100mm	150mm	250mm	Guard Kit <sup>1</sup>	Guard Cartridge <sup>2</sup>
3µm	2.1mm <sup>3</sup>	238DE3205	238DE3210	—	—	—	—
	4.6mm <sup>3</sup>	238DE3405	238DE3410	—	—	238GK34DE	238GD34DE
5µm	1.0mm <sup>3</sup>	238DE5105	238DE5110	238DE5115	238DE51	238GK51DE	238GD51DE
	2.1mm <sup>3</sup>	238DE5205	238DE5210	238DE5215	238DE52	238GK52DE	238GD52DE
	4.6mm <sup>3</sup>	238DE5405	238DE5410	238DE5415	238DE54	238GK54DE	238GD54DE

NOTE: Additional column diameters and lengths are available on request. Please contact Grace Davison Discovery Sciences to discuss your requirements.

<sup>1</sup>A guard kit includes a holder and one guard cartridge. <sup>2</sup>Guard cartridge units include two guard cartridges. <sup>3</sup>Titanium frits are standard in column diameters 4.6mm and smaller.

# Vydac® 201TP and 202TP C18

## Specialty Reversed Phases for PAH and Vitamins

- 201TP: The standard for PAH analysis in all types of environmental samples. Vydac® 201TP columns separate the EPA 16 priority pollutants in less than 20 minutes.
- 202TP3405: Rapid analysis to separate the 16 priority pollutant PAHs in under 10 minutes
- 202TP54 and 202TP5415: For the analysis of derivatized PAHs

VYDAC



7110

Vydac® 201TP and 202TP columns were developed specifically for the separation and quantification of PAHs required by environmental regulations, current and future. Beyond the 16 EPA priority pollutant PAHs, Vydac® PAH columns are used to separate many other PAHs, such as methylated naphthalenes.

### Vydac® 201TP and 202TP C18 Specifications

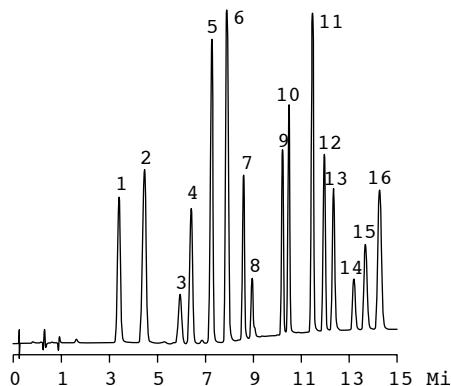
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
201TP C18	Silica	Spheroidal	5, 7, 10, 10–15, 15–20µm	300Å	70–90m <sup>2</sup> /g	8%	Polymeric	No	L1
202TP C18	Silica	Spheroidal	3, 5, 10µm	300Å	60–90m <sup>2</sup> /g	9%	Polymeric	No	L1

## Vydac® 201TP

Vydac® 201TP HPLC columns have long been the standard for the analysis of PAHs in water, air, soil, automotive exhaust, and food. They were used to establish standard reference materials, measure air quality, measure PAHs in sediments, quantify PAHs in food, and study high molecular weight PAHs. They have also been used in the study of shape selectivity of reversed-phase materials.

### Priority Pollutants PAHs In Accordance with EPA Methods 505, 550.1, 610, and 8310

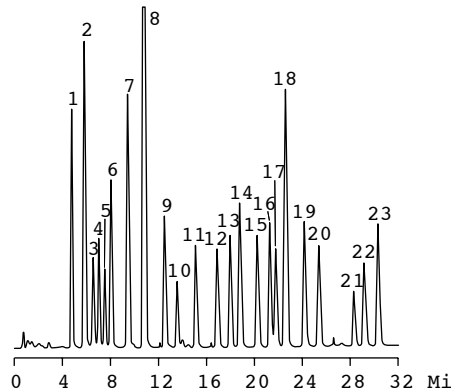
- |                   |                            |
|-------------------|----------------------------|
| 1. Naphthalene    | 9. Benz[a]anthracene       |
| 2. Acenaphthylene | 10. Chrysene               |
| 3. Acenaphthene   | 11. Benzo[b]fluoranthene   |
| 4. Fluorene       | 12. Benzo[k]fluoranthene   |
| 5. Phenanthrene   | 13. Benzo[a]pyrene         |
| 6. Anthracene     | 14. Dibenz[ah]anthracene   |
| 7. Fluoranthene   | 15. Benzo[ghi]perylene     |
| 8. Pyrene         | 16. Indeno[1,2,3-cd]pyrene |



**Column:** Vydac® C18, 5µm, 4.6 x 150mm (Part No. 201TP5415)  
**Flow Rate:** 1.5mL/min  
**Mobile Phase:** A: Water B: ACN  
**Gradient:** Hold 50% B for 3min, then 50 to 100% B in 7min  
**Detector:** UV at 254nm

### PAHs Beyond the EPA Priority Pollutants

- |                          |                                    |
|--------------------------|------------------------------------|
| 1. Naphthalene           | 13. Benz[a]anthracene              |
| 2. Acenaphthylene        | 14. Chrysene                       |
| 3. 1-Methylnaphthalene   | 15. Benzo[b]naphtho[2,1-d]thiopen  |
| 4. 2-Methylnaphthalene   | 16. 7,12-Dimethylbenz[a]anthracene |
| 5. Acenaphthene          | 17. Benzo[e]pyrene                 |
| 6. Fluorene              | 18. Benzo[b]fluoranthene           |
| 7. Phenanthrene          | 19. Benzo[k]fluoranthene           |
| 8. Anthracene            | 20. Benzo[a]pyrene                 |
| 9. Fluoranthene          | 21. Dibenz[ah]anthracene           |
| 10. Pyrene               | 22. Benzo[ghi]perylene             |
| 11. Benzo[c]phenanthrene | 23. Indeno[1,2,3-cd]pyrene         |
| 12. Cyclopenta[cd]pyrene |                                    |



**Column:** Vydac® C18, 5µm, 4.6 x 150mm (Part No. 201TP5415)  
**Flow Rate:** 1.0mL/min  
**Mobile Phase:** A: Water B: ACN  
**Gradient:** 50 to 100% B over 30min  
**Column Temp:** 30°C  
**Detector:** UV at 254nm

### more applications

To view our complete searchable chromatogram database visit [www.discoverysciences.com/chromdb/](http://www.discoverysciences.com/chromdb/)



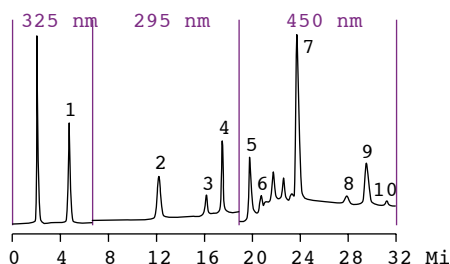
## Vydac® 201TP (continued)

### Vitamins

Vydac® 201TP columns also have application in the analysis of carotenoids, retinoids, and vitamins.

#### Retinol, $\alpha$ -Tocopherol, and $\beta$ -Carotene in Serum

1. All-trans-retinol (vitamin A)
2. Tocol
3.  $\gamma$ -Tocopherol
4.  $\alpha$ -Tocopherol (vitamin E)
5. Lutein
6. Zeaxanthin
7. Cryptoxanthin
8.  $\alpha$ -Carotene
9. All-trans- $\beta$ -carotene
10. Cis- $\beta$ -carotene



**Column:** Vydac® 201TP C18, 5 $\mu$ m, 4.6 x 250mm (Part No. 201TP54)  
**Flow Rate:** 1.5mL/min  
**Mobile Phase:** A: 15:75:10 Buffer/Methanol/n-Butanol  
 B: 2:88:10 Buffer/Methanol/n-Butanol  
 Buffer = Aqueous 0.02 M NH<sub>4</sub>OAc, pH 3.5  
**Gradient:** 100% A for 3min, then 0 to 100% B over 15min, then hold 100% B  
**Detector:** UV, programmed wavelengths

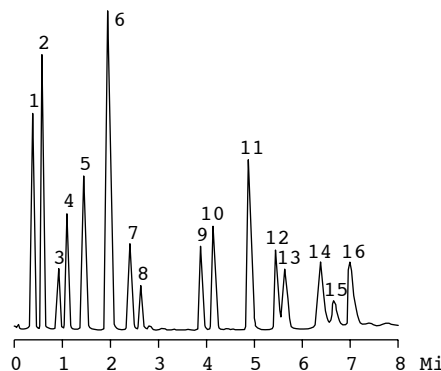
Chromatogram reproduced with author's permission. From W.A. MacCrehan and E. Schonberger, *Clin. Chem.*, 33(9), 1585-1592 (1987).

## Vydac® 202TP

Built on top of the success of 201TP, 202TP columns are ideal for derivatized PAH samples or high throughput PAH analyses.

#### Rapid Analysis of Polyaromatic Hydrocarbons

1. Naphthalene
2. Acenaphthylene
3. Acenaphthene
4. Fluorene
5. Phenanthrene
6. Anthracene
7. Fluoranthene
8. Pyrene
9. Benz[a]anthracene
10. Chrysene
11. Benzo[b]fluoranthene
12. Benzo[k]fluoranthene
13. Benzo[a]pyrene
14. Benzo[ghi]perylene
15. Dibenzo[ah]anthracene
16. Indeno[1,2,3-cd]pyrene



**Column:** Vydac® 202TP C18, 5 $\mu$ m, 4.6 x 50mm (Part No. 202TP3405)  
**Flow Rate:** 3.0mL/min  
**Mobile Phase:** A: Water B: ACN  
**Gradient:** 40 to 95% B in 8min  
**Column Temp:** 30°C  
**Detector:** UV at 254nm

### 201TP C18 Analytical Columns

Particle Size	Columns					Recommended Guards	
	i.d.	50mm	100mm	150mm	250mm	Guard Kit <sup>1</sup>	Guard Cartridge <sup>2</sup>
5 $\mu$ m	1.0mm	201TP5105	—	201TP5115	201TP51	201GK51T	201GD51T
	2.1mm	201TP5205	201TP5210	201TP5215	201TP52	201GK52T	201GD52T
	3.2mm	—	—	201TP5315	201TP53	201GK54T	201GD54T
	4.6mm	201TP5405	201TP5410	201TP5415	201TP54	201GK54T	201GD54T
10 $\mu$ m	4.6mm	—	—	201TP10415	201TP104	201GK104T	201GD104T

<sup>1</sup>A guard kit includes a holder and one guard cartridge. <sup>2</sup>Guard cartridge units include two guard cartridges.

### 202TP High-Carbon-Load C18 Analytical Columns

Particle Size	Columns				Recommended Guards		
	i.d.	50mm	100mm	150mm	250mm	Guard Kit <sup>1</sup>	Guard Cartridge <sup>2</sup>
3 $\mu$ m	3.2mm	—	—	202TP3315	—	—	—
	4.6mm	202TP3405	202TP3410	—	—	—	—
5 $\mu$ m	4.6mm	—	—	202TP5415	202TP54	202GK54T	202GD54T
10 $\mu$ m	4.6mm	202TP10405	—	—	—	202GK104T	202GD104T

<sup>1</sup>A guard kit includes a holder and one guard cartridge. <sup>2</sup>Guard cartridge units include two guard cartridges.

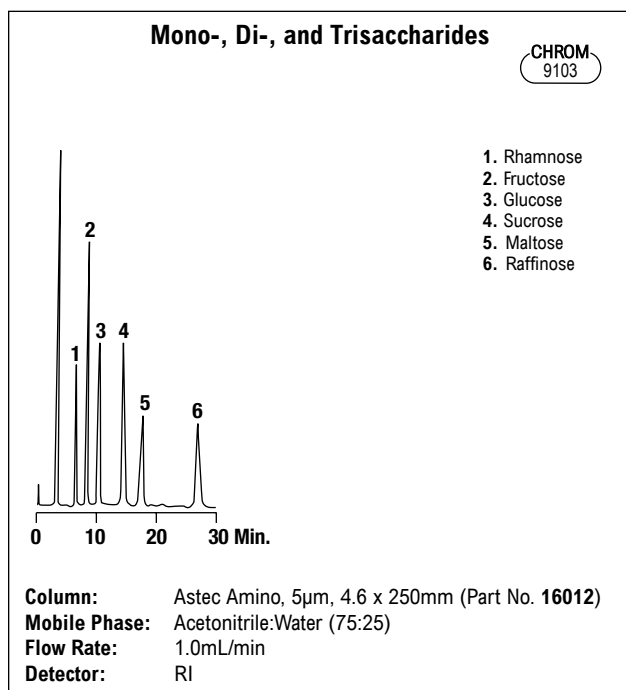


## Astec Amino and Reversed-Phase Columns

- Durable vinyl alcohol copolymer
- Stable from pH 2–13
- Stable and reproducible performance

Choose Astec amino columns for separating mono- and oligosaccharides. Astec's polymer base makes these columns much more stable than silica-based amino columns.

Choose Astec reversed-phase columns for amines and high recoveries of proteins and peptides. Because there are no silanols, elution order is always based on hydrophobicity of the analytes rather than polar interactions with the base material. High recovery of proteins and peptides is typical even at low sample loads.



### Astec Amino and Reversed-Phase 300Å Columns

Packing	Format	i.d. x Length	Part No.
C18, 5 $\mu$ m	Analytical	4.6 x 150mm	16004
	Analytical	4.6 x 250mm	16005
C8, 5 $\mu$ m	Analytical	4.6 x 150mm	16006
	Analytical	4.6 x 250mm	16007
C4, 5 $\mu$ m	Analytical	4.6 x 150mm	16008
	Analytical	4.6 x 250mm	16009
Amino, 5 $\mu$ m	Analytical	4.6 x 250mm	16012

### Astec Amino and Reversed-Phase Guard Columns

Packing	i.d. x Length	Qty.	Part No.
C18, 5 $\mu$ m	4.6 x 10mm	ea	28180
C8, 5 $\mu$ m	4.6 x 10mm	ea	28181
C4, 5 $\mu$ m	4.6 x 10mm	ea	28182
Amino, 5 $\mu$ m	4.6 x 10mm	ea	28187

## Astec Cyclobond™ Columns

### For Chiral Separations

- Versatile chiral selectors
- High-purity 5 $\mu$ m spherical silica

#### Cyclodextrin Phases

Designation	Substituent
I 2000	$\beta$ -Cyclodextrin
I 2000 Ac	$\beta$ -Cyclodextrin Acetylate
I 2000 RSP	$\beta$ -Cyclodextrin R,S-Hydroxypropyl Ether
I 2000 DMP	$\beta$ -Cyclodextrin 3,5-Dimethylphenyl Carbamate
II	$\gamma$ -Cyclodextrin

**Cyclobond™ I 2000** has the broadest applicability, and is ideal for small analytes in pharmaceutical, chemical, and environmental applications.

**Cyclobond™ 1 2000 Ac** is ideal for aromatic alcohols or amines that are chiral on the alpha or beta carbon.

**Cyclobond™ I 2000 RSP** is a general-purpose chiral stationary phase. It can separate non-aromatic structures such as t-boc amino acids.

**Cyclobond™ DMP** shows good selectivity when the chiral centers are part of a ring structure or on the alpha carbon. This phase is ideal for derivatized amines such as amphetamine ACQ.

**Cyclobond™ II** is useful for isomeric compounds based on anthracene, chrysene, and pyrene ring structures. Some applications include steroids, porphyrins, and Fmoc amino acids.

#### Astec Cyclobond™ Columns

Packing	Format	i.d. x Length	Part No.
I 2000, 5 $\mu$ m	Analytical	4.6 x 100mm	400101
	Analytical	4.6 x 250mm	410101
I 2000 Ac, 5 $\mu$ m	Analytical	4.6 x 250mm	410121
I 2000 RSP, 5 $\mu$ m	Analytical	4.6 x 250mm	411121
I 2000 DMP, 5 $\mu$ m	Analytical	4.6 x 250mm	412111
II	Analytical	4.6 x 100mm	400201
	Analytical	4.6 x 250mm	410201

#### Astec Cyclobond™ Guard Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
I 2000, 5 $\mu$ m	4.0 x 20mm	ea	430102
I 2000 Ac, 5 $\mu$ m	4.0 x 20mm	ea	430103
I 2000 RSP, 5 $\mu$ m	4.0 x 20mm	ea	430105
I 2000 DMP, 5 $\mu$ m	4.0 x 20mm	ea	430108
II	4.0 x 20mm	ea	430109
Astec Guard Cartridge Holder			ea 11014

\*Guard holder required.

# Astec Chirobiotic™ HPLC Columns

## For Multi-Mode Chiral Separations

- Bonded macrocyclic glycopeptide phases
- Three complimentary selectivities
- High-purity 5µm spherical silica

Chirobiotic™ columns demonstrate a broad selectivity in reversed phase, normal phase, and polar organic modes. This gives Chirobiotic™ columns the ability to separate a greater variety of chiral analytes than columns that can only operate in one mode.

### Chirobiotic™ V

#### Chirobiotic™ V Specifications

**Ligand:** Vancomycin  
**Ideal For:** Neutral molecules, amides, acids, esters, cyclic amines

Chirobiotic™ V has a selectivity similar to glycoprotein phases while also being stable from 0–100% organic modifiers. New Chirobiotic™ V2 has enhanced selectivity and capacity in the polar organic mode, and increased capacity.

### Chirobiotic™ T

#### Chirobiotic™ T Specifications

**Ligand:** Teicoplanin  
**Ideal For:** Underivatized amino acids, n-derivatized amino acids, carboxylic acids, phenols, neutral aromatics, cyclic aromatics with aliphatic amines

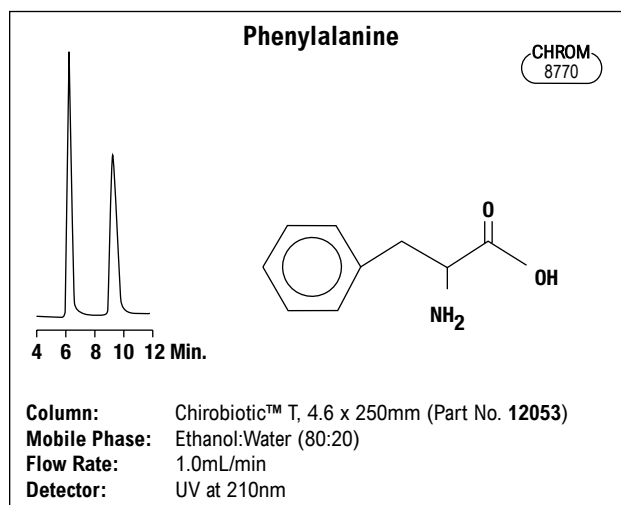
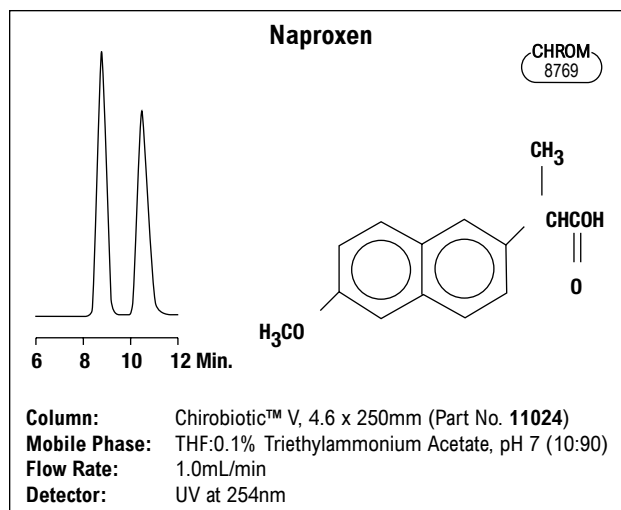
Chirobiotic™ T is an excellent alternative to crown ether and ligand exchange for amino acids and hydroxy acids. New Chirobiotic™ T2 has enhanced selectivity and capacity in the polar organic mode.

### Chirobiotic™ R

#### Chirobiotic™ R Specifications

**Ligand:** Ristocetin A  
**Ideal For:** Anionic molecules, di- and tri-peptides, α-hydroxy acids, substituted aliphatic acids, aromatic esters, chiral alcohols, secondary and tertiary amines

Chirobiotic™ R is the largest and most complex of the Chirobiotic™ ligands. Sugar moieties, a peptide chain, and additional ionizable groups give this structure the complexity and diversity to separate a wide variety of analytes.



#### Astec Chirobiotic™ Columns

Packing	Format	i.d. x Length	Part No.
Chirobiotic™ V	Analytical	4.6 x 50mm	11346
	Analytical	4.6 x 150mm	11023
	Analytical	4.6 x 250mm	11024
Chirobiotic™ V2	Analytical	4.6 x 100mm	A15022
	Analytical	4.6 x 150mm	A15023
	Analytical	4.6 x 250mm	A15024
Chirobiotic™ T	Analytical	4.6 x 50mm	11349
	Analytical	4.6 x 150mm	12051
	Analytical	4.6 x 250mm	12053
Chirobiotic™ T2	Analytical	4.6 x 100mm	A16022
	Analytical	4.6 x 150mm	A16023
	Analytical	4.6 x 250mm	A16024
Chirobiotic™ R	Analytical	4.6 x 50mm	12514
	Analytical	4.6 x 150mm	12516
	Analytical	4.6 x 250mm	12518

#### Astec Chirobiotic™ Guard Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
Chirobiotic™ V, 5µm	4.0 x 20mm	ea	11019
Chirobiotic™ T, 5µm	4.0 x 20mm	ea	12445
Chirobiotic™ R, 5µm	4.0 x 20mm	ea	12522
Astec Guard Cartridge Holder		ea	11014

\*Guard holder required.

# Brownlee™ Columns







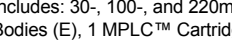
## Economical MPLC™ Cartridge System with Reusable Hardware

- Finger-tight modular design
- Reusable end assemblies with interchangeable holders
- Guards fit conventional columns or MPLC™ hardware

The Brownlee™ MPLC™ Cartridge system is convenient and easy to use. Decide which column length you prefer, and purchase the hardware and the disposable packed cartridges separately.

### Cartridge Hardware

#### Brownlee™ MPLC™ Cartridge Hardware




Photo	Description	Part No.
<i>MPLC™ Cartridge Holders</i>		
	30mm	<b>140200</b>
	100mm	<b>140230</b>
	220mm	<b>140400</b>
<i>MPLC™ Cartridge Accessories</i>		
	MPLC™ Cartridge Union	<b>140300</b>
	MPLC™ Cartridge End Assembly	<b>1402501</b>
<i>MPLC™ Cartridge Holder Bodies</i>		
	30mm	<b>140203</b>
	100mm	<b>140003</b>
	220mm	<b>140403</b>
<i>Universal MPLC™ Cartridge Holder Kit</i>		<b>140530</b>
Includes: 30-, 100-, and 220mm MPLC™ Cartridge Holder Bodies (E), 1 MPLC™ Cartridge Union (C), 2 End Assemblies (D), and 1 NewGuard™ End Assembly (H)		

#### Brownlee™ MPLC™ Cartridge Hardware Seals

Description	Part No.
Analytical Holder Seal Replacement Kit Includes Tool and 2 Seals	<b>140260</b>
Analytical Seals, 2/pk Seal Replacement Tool Required	<b>140216</b>

### NewGuard™ System

#### Brownlee™ MPLC™ NewGuard™ Hardware

Photo	Description	Part No.
	NewGuard™ Cartridge Holders NewGuard™ Holder for use with Conventional Columns	<b>140601</b>
	220mm NewGuard™ System Holder for Direct Coupling of 220mm Analytical Cartridge with a NewGuard™ Cartridge	<b>140410</b>
	NewGuard™ End Assembly	<b>140600</b>

#### Brownlee™ NewGuard™ Cartridges\*

Description	Qty.	Part No.
RP-18	3	<b>141004</b>
RP-8	3	<b>141003</b>
Cyano	3	<b>141008</b>
Amino	3	<b>141007</b>
Silica	3	<b>141012</b>
Anion (AX-300)	3	<b>141009</b>

\*NewGuard™ cartridge holder required (Part No. **140601**).

### Spheri-5™ and Spheri-10™ Cartridges

- Rugged and reproducible
- Use with MPLC™ cartridge hardware
- 80Å, spherical silica

RP-18 and RP-8 phases are monomeric for optimum mass transfer kinetics and high efficiency. The ODS phase is polymeric and more suitable for acidic mobile phases.

#### Brownlee™ Spheri-5™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
<i>ODS (C18), 5µm</i>	2.1 x 30mm	2	<b>141061</b>
	2.1 x 100mm	ea	<b>141063</b>
	2.1 x 220mm	ea	<b>141065</b>
	4.6 x 30mm	2	<b>141060</b>
	4.6 x 100mm	ea	<b>141062</b>
	4.6 x 220mm	ea	<b>141064</b>
<i>RP-18, 5µm</i>	2.1 x 30mm	2	<b>141052</b>
	2.1 x 100mm	ea	<b>141054</b>
	2.1 x 220mm	ea	<b>141056</b>
	4.6 x 100mm	ea	<b>141053</b>
	4.6 x 220mm	ea	<b>1410551</b>
	<i>RP-8, 5µm</i>	2.1 x 30mm	2
2.1 x 100mm		ea	<b>141030</b>
2.1 x 220mm		ea	<b>141032</b>
4.6 x 30mm		2	<b>141027</b>
4.6 x 100mm		ea	<b>141029</b>
4.6 x 220mm		ea	<b>141031</b>
<i>Cyano, 5µm</i>	4.6 x 30mm	2	<b>141083</b>
	4.6 x 100mm	ea	<b>141085</b>
	4.6 x 220mm	ea	<b>141087</b>
<i>Amino, 5µm</i>	4.6 x 30mm	2	<b>141177</b>
	4.6 x 100mm	ea	<b>141179</b>
	4.6 x 220mm	ea	<b>141181</b>
	<i>Silica, 5µm</i>	2.1 x 30mm	2
4.6 x 30mm		2	<b>141193</b>
4.6 x 100mm		ea	<b>141195</b>
4.6 x 220mm		ea	<b>141197</b>

\*Brownlee™ MPLC™ cartridge holder required.

#### Brownlee™ Spheri-10™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
<i>RP-18, 10µm</i>	4.6 x 30mm	2	<b>141043</b>
	4.6 x 100mm	ea	<b>1410451</b>
<i>RP-8, 10µm</i>	4.6 x 30mm	2	<b>141020</b>
	4.6 x 100mm	ea	<b>141022</b>
<i>Silica, 10µm</i>	4.6 x 30mm	2	<b>141186</b>

\*Brownlee™ MPLC™ cartridge holder required.

### Aquapore™ DEAE WAX Cartridges

- Large pore for macromolecules

Choose AX-300 with its DEAE functional group for weak anion exchange applications with proteins and peptides.

#### Brownlee™ Aquapore™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
<i>AX-300, 7µm</i>	4.6 x 30mm	2	<b>141212</b>
	4.6 x 100mm	ea	<b>141214</b>

\*Brownlee™ MPLC™ cartridge holder required.

# Jordi Columns

## Normal- and Reversed-Phase

- **Rugged**—use at high temperatures, from pH 0–14, with any solvent
- **Silanol Free**—analyze polar compounds without silanol effects

Jordi normal-phase and reversed-phase columns are made from highly pure 5µm DVB, for extremely durable and efficient phases.

Jordi Specifications			
Phase	Particle Size	Pore Size	Description
<b>RP-DVB</b>	5µm	500Å, 1000Å	Reversed-phase, not bonded
<b>C18-DVB</b>	5µm	500Å	Reversed-phase, C18 bonded
<b>Polyamine-DVB</b>	5µm	500Å	Normal-phase

### RP-DVB

RP-DVB is a reversed-phase non-polar packing with a high degree of aromatic character. SM-500, with a 500Å pore, is recommended for most applications. LM-1000, with a 1000Å pore, is ideal for molecules 100,000 Daltons or larger.

### C18-DVB

C18-DVB has C18 chains bonded to the DVB base. These columns are more hydrophobic than traditional C18 columns and have different selectivities due to the absence of silanols.

### Polyamine-DVB

Polyamine-DVB is a normal-phase column for simple sugar and polysaccharide applications. The DVB-based packing provides a non-reactive amine surface that lasts longer and equilibrates faster than traditional silica-based amine columns. Polyamine-DVB columns can be used with aqueous mobile phases, even 1M NaOH. Ideal for carbohydrate analyses requiring sharp peaks and short run times.

#### Jordi HPLC Columns

Packing	Format	i.d. x Length	Part No.
RP-DVB (SM-500Å), 5µm	Analytical	4.6 x 150mm	<b>1005500</b>
	Analytical	4.6 x 250mm	<b>1005520</b>
RP-DVB (LM-1000Å), 5µm	Analytical	4.6 x 150mm	<b>1005580</b>
	Analytical	4.6 x 250mm	<b>1005585</b>
C18-DVB (500Å), 5µm	Analytical	4.6 x 150mm	<b>18500</b>
	Analytical	4.6 x 250mm	<b>18501</b>
Polyamine-DVB (500Å), 5µm	Analytical	4.6 x 250mm	<b>1005900</b>

#### Jordi All-Guard™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
RP-DVB (SM-500Å), 5µm	4.6 x 7.5mm	3	<b>1005595</b>
RP-DVB (LM-1000Å), 5µm	4.6 x 7.5mm	3	<b>1005596</b>
C18-DVB (500Å), 5µm	4.6 x 7.5mm	3	<b>1005601</b>
Polyamine-DVB (500Å), 5µm	4.6 x 7.5mm	3	<b>1005615</b>
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	<b>80101</b>

\*All-Guard™ holder required. Other particle sizes available.



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### related product

Looking for column heaters?  
See pages 16 and 17.

## GPC Columns

### Organic GPC

- **Rugged**—highly crosslinked DVB for broad temperature stability and solvent compatibility
- **Powerful**—high pore volume for greater resolution from a single column

#### Jordi Organic and Aqueous GPC Specifications

Pore Size	Pressure Limit	MW Range (Daltons)
100Å	8000psig	100–5000
500Å	8000psig	100–10,000
103Å	8000psig	100–25,000
104Å	2000psig	100–2,000,000
105Å	2000psig	10,000–10,000,000
Mixed Bed	2000psig	100→>10,000,000

Jordi HPLC columns, offer unparalleled resistance to shrinking and swelling, as well as better temperature and solvent compatibility than traditional ps-DVB phases.

The high pore volume speeds up your analyses. A single 10 x 500mm Jordi column replaces three 7.8 x 300mm ps-DVB columns and separates the same sample in 40% less time.

### Aqueous GPC

Glucose-DVB packings are rugged, hydrophilic packings for separating polar compounds. Glucose units are bonded to the DVB base to yield a hydrophilic surface. Glucose-DVB columns equilibrate faster than silica-based columns.

#### Jordi Organic GPC Columns\*

Pore Size	Format	i.d. x Length	Part. No.
100Å, 5µm	Semi Prep	7.8 x 300mm	<b>10510</b>
	Prep	10 x 250mm	<b>100561</b>
500Å, 5µm	Semi Prep	7.8 x 300mm	<b>10511</b>
	Prep	10 x 250mm	<b>100565</b>
	Prep	10 x 500mm	<b>100567</b>
103Å, 5µm	Semi Prep	7.8 x 300mm	<b>10512</b>
	Prep	10 x 250mm	<b>100569</b>
104Å, 5µm	Semi Prep	7.8 x 300mm	<b>10513</b>
	Prep	10 x 250mm	<b>100573</b>
105Å, 5µm	Semi Prep	7.8 x 300mm	<b>10514</b>
	Prep	10 x 250mm	<b>100577</b>
Mixed-Bed Linear, 5µm	Semi Prep	7.8 x 300mm	<b>10515</b>
	Prep	10 x 250mm	<b>100581</b>
	Prep	10 x 500mm	<b>100583</b>

\*Jordi GPC columns are constructed from Type 316 stainless steel. All tubing connections are 1/16" female. Columns are shipped in Chloroform unless otherwise requested when placing order.

#### Jordi Aqueous GPC Columns

Pore Size	Format	i.d. x Length	Part No.
100Å, 5µm	Semi Prep	7.8 x 300mm	<b>10517</b>
	Prep	10 x 250mm	<b>100761</b>
500Å, 5µm	Semi Prep	7.8 x 300mm	<b>10518</b>
	Prep	10 x 250mm	<b>100765</b>
103Å, 5µm	Semi Prep	7.8 x 300mm	<b>10519</b>
	Prep	10 x 250mm	<b>100769</b>
104Å, 5µm	Semi Prep	7.8 x 300mm	<b>10520</b>
	Prep	10 x 250mm	<b>100773</b>
105Å, 5µm	Semi Prep	7.8 x 300mm	<b>10521</b>
	Prep	10 x 250mm	<b>100777</b>
Mixed-Bed Linear, 5µm	Semi Prep	7.8 x 300mm	<b>10522</b>
	Prep	10 x 250mm	<b>100781</b>
	Prep	10 x 500mm	<b>100783</b>

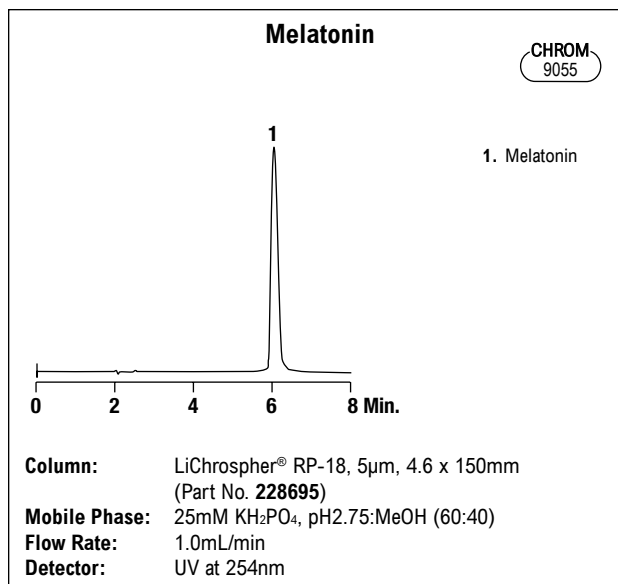
# Merck LiChrosorb® and LiChrospher® Columns

- LiChrosorb®—irregular silica for larger surface areas
- LiChrospher®—spherical silica for higher stability and reproducibility

All Merck columns are packed by Grace to our highest QC standards. Custom columns are available.

### LiChrosorb® HPLC Columns

Packing	Format	i.d. x Length	Part No.
RP-18, 5µm	Solvent Reducer	3.0 x 150mm	<b>38513</b>
	Solvent Reducer	3.0 x 250mm	<b>38514</b>
	Analytical	4.6 x 250mm	<b>8684</b>
RP Select B, 5µm	Analytical	4.6 x 150mm	<b>228700</b>
	Analytical	4.6 x 250mm	<b>228685</b>
RP-8, 5µm	Solvent Reducer	3.0 x 150mm	<b>38515</b>
	Solvent Reducer	3.0 x 250mm	<b>38516</b>
	Analytical	4.6 x 250mm	<b>8692</b>
Amino, 5µm	Analytical	4.6 x 250mm	<b>228872</b>
Si-60, 10µm	Analytical	4.6 x 250mm	<b>8369</b>
Si-100, 10µm	Analytical	4.6 x 250mm	<b>8720</b>



hplc columns | small molecule



Alltech® All-Guard™ System—change cartridges in seconds without tools.

### LiChrospher® HPLC Columns

Packing	Format	i.d. x Length	Part No.
RP-18, 3µm	Analytical	4.6 x 150mm	<b>228688</b>
RP-18, 5µm	Analytical	4.6 x 150mm	<b>228695</b>
	Analytical	4.6 x 250mm	<b>228673</b>
RP-18 EC, 3µm	Analytical	4.6 x 150mm	<b>228686</b>
RP-18 EC, 5µm	Analytical	4.6 x 150mm	<b>228694</b>
	Analytical	4.6 x 250mm	<b>228672</b>
RP-8, 5µm	Analytical	4.6 x 150mm	<b>228696</b>
	Analytical	4.6 x 250mm	<b>228675</b>
RP-8 EC, 5µm	Analytical	4.6 x 150mm	<b>228697</b>
	Analytical	4.6 x 250mm	<b>228678</b>
RP-Select B, 5µm	Analytical	4.6 x 150mm	<b>228611</b>
	Analytical	4.6 x 250mm	<b>228613</b>
Amino, 5µm	Analytical	4.6 x 150mm	<b>228693</b>
	Analytical	4.6 x 250mm	<b>228670</b>
Si-60, 5µm	Analytical	4.6 x 150mm	<b>228699</b>
	Analytical	4.6 x 250mm	<b>228683</b>

### LiChrosorb® All-Guard™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
RP-18, 5µm	3.0 x 7.5mm	3	<b>96374</b>
	4.6 x 7.5mm	3	<b>96171</b>
RP-Select B, 5µm	4.6 x 7.5mm	3	<b>96181</b>
RP-8, 5µm	3.0 x 7.5mm	3	<b>96373</b>
	4.6 x 7.5mm	3	<b>96173</b>
Amino, 5µm	4.6 x 7.5mm	3	<b>96175</b>
Silica, 5µm	4.6 x 7.5mm	3	<b>96201</b>
All-Guard™ Cartridge Holder (Includes Direct-Connect™ Column Coupler)		ea	<b>80101</b>

\*All-Guard™ holder required. Other particle sizes available.

### LiChrospher® All-Guard™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
RP-18, 5µm	4.6 x 7.5mm	3	<b>96185</b>
RP-18 Endcapped, 5µm	4.6 x 7.5mm	3	<b>96183</b>
RP-8, 5µm	4.6 x 7.5mm	3	<b>96189</b>
RP-8 Endcapped, 5µm	4.6 x 7.5mm	3	<b>96187</b>
RP Select B, 5µm	4.6 x 7.5mm	3	<b>96425</b>
Amino, 5µm	4.6 x 7.5mm	3	<b>96191</b>
Silica, 5µm	4.6 x 7.5mm	3	<b>96201</b>
All-Guard™ Cartridge Holder (Includes Direct-Connect™ Column Coupler)		ea	<b>80101</b>

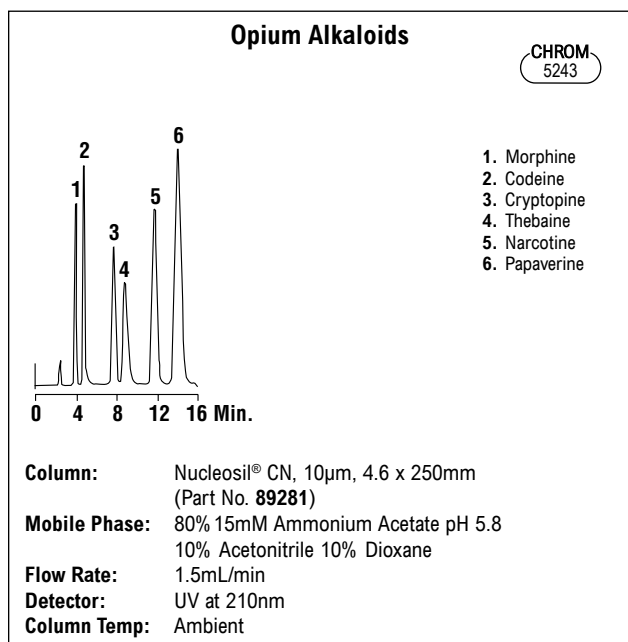
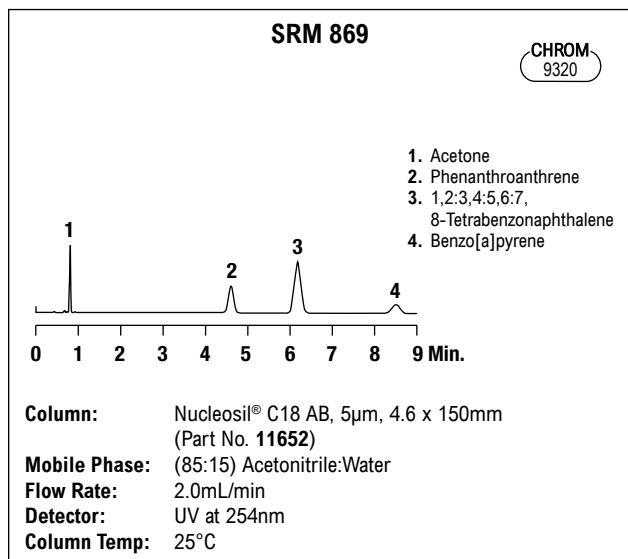
\*All-Guard™ holder required. Other particle sizes available.

# Macherey-Nagel Nucleosil® Columns

- 100Å, high-purity silica
- Narrow particle size distribution
- A choice of phases for any application

All Nucleosil® columns are packed by Grace to our highest QC standards.

C18 AB is polymerically bonded specifically for reversed-phase chromatography of acidic and basic compounds. It has a 25% carbon load for strong retention.



## Nucleosil® HPLC Columns

Packing	Format	i.d. x Length	Part No.	Waters® Fittings Part No.
C18, 3µm	Analytical	4.6 x 100mm	89531	89532
	Analytical	4.6 x 150mm	89511	89512
C18, 5µm	Analytical	4.6 x 150mm	89161	89162
	Analytical	4.6 x 250mm	89141	89142
C18, 10µm	Analytical	4.6 x 250mm	89121	89122
C18 AB, 5µm	Analytical	4.6 x 150mm	11652	—
	Analytical	4.6 x 250mm	11657	—
C8, 5µm	Analytical	4.6 x 150mm	89221	89222
	Analytical	4.6 x 250mm	89201	89202
C8, 10µm	Analytical	4.6 x 250mm	89181	89182
Phenyl, 7µm	Analytical	4.6 x 150mm	89261	89262
	Analytical	4.6 x 250mm	89241	89242
Cyano, 5µm	Analytical	4.6 x 150mm	89321	89322
	Analytical	4.6 x 250mm	89301	89302
Cyano, 10µm	Analytical	4.6 x 250mm	89281	89282
Amino, 5µm	Analytical	4.6 x 150mm	89381	89382
	Analytical	4.6 x 250mm	89361	89362
Amino, 10µm	Analytical	4.6 x 250mm	89341	89342
Silica, 5µm	Analytical	4.6 x 150mm	89441	89442
	Analytical	4.6 x 250mm	89421	89422
Silica, 10µm	Analytical	4.6 x 250mm	89401	89402
SA, 5µm	Analytical	4.6 x 150mm	228498	228504
	Analytical	4.6 x 250mm	228497	228503
SA, 10µm	Analytical	4.6 x 250mm	228496	228502
	SB, 5µm	Analytical	4.6 x 150mm	228501
Analytical		4.6 x 250mm	228500	228506
SB, 10µm	Analytical	4.6 x 250mm	228499	228505



Alltech® All-Guard™ System—change cartridges in seconds without tools.

## Nucleosil® All-Guard™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
C18, 5µm	4.6 x 7.5mm	3	96210
C8, 5µm	4.6 x 7.5mm	3	96211
Phenyl, 5µm	4.6 x 7.5mm	3	96214
Cyano, 5µm	4.6 x 7.5mm	3	96213
Amino, 5µm	4.6 x 7.5mm	3	96212
Silica, 5µm	4.6 x 7.5mm	3	96215
SA, 5µm	4.6 x 7.5mm	3	89340
SB, 5µm	4.6 x 7.5mm	3	89345
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	80101

\*All-Guard™ holder required. Other particle sizes available.

## more info

For more HPLC Applications, see pages 395–453.

## more applications

To view our complete searchable chromatogram database visit [www.discoverysciences.com/chromdb/](http://www.discoverysciences.com/chromdb/)



## Whatman Partisil™ Columns

All Whatman Partisil™ columns are packed by Grace to our highest QC standards. Partisil® columns use 85Å, irregular silica with a surface area of 350m<sup>2</sup>/g.

Partisil™ PAC is a polar amino cyano phase with secondary amino groups for thermal and chemical stability. It separates primarily by reversed-phase or weak anion exchange.

### Partisil™ HPLC Columns

Packing	Format	i.d. x Length	Part No.	Waters® Fittings Part No.
ODS, 10µm	Analytical	4.6 x 250mm	<b>8246</b>	<b>8247</b>
ODS-2, 5µm	Analytical	4.6 x 250mm	<b>12571</b>	<b>12572</b>
ODS-2, 10µm	Analytical	4.6 x 250mm	<b>8251</b>	<b>8252</b>
ODS-3, 5µm	Analytical	4.6 x 250mm	<b>8660</b>	<b>8662</b>
ODS-3, 10µm	Analytical	4.6 x 250mm	<b>8256</b>	<b>8257</b>
C8, 5µm	Analytical	4.6 x 250mm	<b>8668</b>	<b>8670</b>
C8, 10µm	Analytical	4.6 x 250mm	<b>8380</b>	<b>8381</b>
PAC, 5µm	Analytical	4.6 x 250mm	<b>8676</b>	<b>8678</b>
PAC, 10µm	Analytical	4.6 x 250mm	<b>8261</b>	<b>8262</b>
Silica, 5µm	Analytical	4.6 x 250mm	<b>8266</b>	<b>8267</b>
Silica, 10µm	Analytical	4.6 x 250mm	<b>8271</b>	<b>8272</b>
SAX, 5µm	Analytical	4.6 x 250mm	<b>12576</b>	<b>12577</b>
SAX, 10µm	Analytical	4.6 x 250mm	<b>8165</b>	<b>8167</b>
SCX, 10µm	Analytical	4.6 x 250mm	<b>8173</b>	<b>8175</b>

### Partisil™ All-Guard™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
ODS, 5µm	4.6 x 7.5mm	3	<b>96252</b>
ODS-2, 5µm	4.6 x 7.5mm	3	<b>96253</b>
ODS-3, 5µm	4.6 x 7.5mm	3	<b>96254</b>
C8, 5µm	4.6 x 7.5mm	3	<b>96255</b>
PAC, 5µm	4.6 x 7.5mm	3	<b>96256</b>
Silica, 5µm	4.6 x 7.5mm	3	<b>96257</b>
SAX, 5µm	4.6 x 7.5mm	3	<b>96259</b>
SCX, 5µm	4.6 x 7.5mm	3	<b>96258</b>
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	<b>80101</b>

\*All-Guard™ holder required. Other particle sizes available.

### technical assistance

Contact Tech Support: Phone: 1.800.255.8324 (North America)  
 Email: [contact.alltech@grace.com](mailto:contact.alltech@grace.com)  
 Online: [www.discoverysciences.com](http://www.discoverysciences.com)

## Whatman Partisphere® WVS Columns

Whatman's Partisphere® WVS columns have built-in void compensators that help you extend the column lifetime. Use the piston-like plungers at each end of the column to compress the bed and seal any voids that develop over time. Choose your column from the table below, and purchase reusable WVS endfittings separately.

### Partisphere® WVS HPLC Cartridges\*

Packing	Format	i.d. x Length	Part No.
C18, 5µm	Analytical	4.6 x 125mm	<b>46210502</b>
C8, 5µm	Analytical	4.6 x 125mm	<b>46210503</b>
PAC, 5µm	Analytical	4.6 x 125mm	<b>46210508</b>
Silica, 5µm	Analytical	4.6 x 125mm	<b>46210501</b>
SAX, 5µm	Analytical	4.6 x 125mm	<b>46210505</b>
SCX, 5µm	Analytical	4.6 x 125mm	<b>46210507</b>
WVS Reusable Endfittings, 2/µk			<b>46310001</b>

\*Reusable endfittings required.

### Partisphere® WVS Guard Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
C18/C8, 5µm	5 x 17mm	5	<b>46410002</b>
PAC, 5µm	5 x 17mm	5	<b>46410008</b>
Silica, 5µm	5 x 17mm	5	<b>46410001</b>
SAX, 5µm	5 x 17mm	5	<b>46410005</b>
SCX, 5µm	5 x 17mm	5	<b>46410007</b>
Guard Cartridge Holder	19 x 40mm	ea	<b>46311004</b>

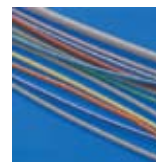
\*Guard holder required.

### more info

For HPLC Applications, see pages 395–453.

### related products

Need HPLC tubing?  
See pages 384–391.



5535

### related products

Looking for high-pressure fittings?  
See pages 112–118.



6673

# Polymer Labs Columns

## Outstanding Durability and Stability

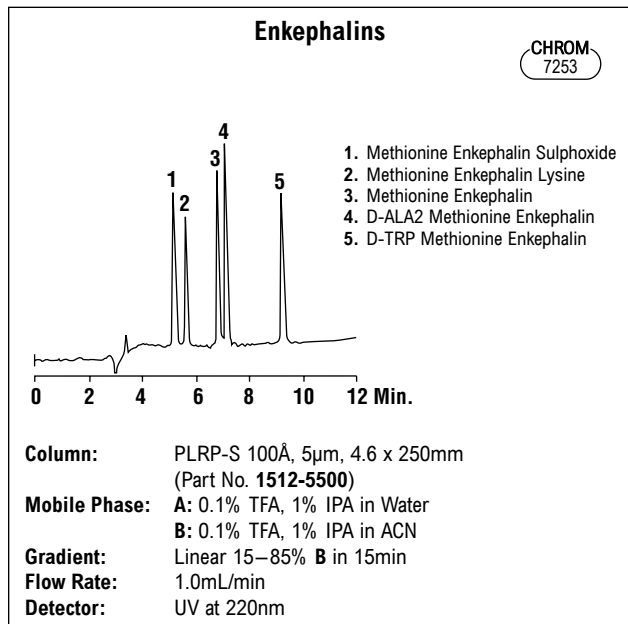
- Ideal for elevated temperature and pressure applications
- Stable from pH 1–13

PLRP-S is a polystyrene divinylbenzene copolymer designed specifically for reversed-phase HPLC. PLRP-S columns are extremely stable, performing over a wide pH range and at elevated temperatures and pressures.

### PLRP-S Choice of Pore Sizes:

- 100Å for small molecules, peptides, and nucleotides
- 300Å for polypeptides and globular proteins
- 1000Å for fibrous proteins
- 4000Å for the analysis of very large biomolecules or high-speed/high-resolution separations

PLRP-S HPLC Specifications	
Base Material	Polystyrene Divinylbenzene
Organic Modifier	0 to 100%
Particle Size	3, 5, 8, 10µm
Pore Size	100, 300, 1000, 4000Å
pH Range	1–13
Max. Temp.	80°C
Max. Pressure	3000psig
Max. Flow Rate	4mL/min



### PLRP-S HPLC Columns

Packing	Format	i.d. x Length	Part No.
100Å, 3µm	Analytical	4.6 x 150mm	<b>1512-3300</b>
	Microbore	2.1 x 50mm	<b>1912-1500</b>
	Microbore	2.1 x 150mm	<b>1912-3500</b>
	Microbore	2.1 x 250mm	<b>1912-5500</b>
	Analytical	4.6 x 50mm	<b>1512-1500</b>
100Å, 5µm	Analytical	4.6 x 250mm	<b>1512-5500</b>
	Analytical	4.6 x 150mm	<b>1512-1301</b>
300Å, 3µm	Microbore	2.1 x 150mm	<b>1912-3301</b>
	Analytical	4.6 x 50mm	<b>1512-1301</b>
	Analytical	4.6 x 150mm	<b>1512-3301</b>
300Å, 5µm	Microbore	2.1 x 250mm	<b>1912-5501</b>
	Analytical	4.6 x 50mm	<b>1512-1501</b>
	Analytical	4.6 x 150mm	<b>1512-3501</b>
	Analytical	4.6 x 250mm	<b>1512-5501</b>
300Å, 8µm	Analytical	4.6 x 150mm	<b>1512-3801</b>
	Analytical	4.6 x 250mm	<b>1512-5801</b>
1000Å, 5µm	Microbore	2.1 x 50mm	<b>1912-1502</b>
	Analytical	4.6 x 50mm	<b>1512-1502</b>
1000Å, 8µm	Microbore	2.1 x 50mm	<b>1912-1802</b>
	Microbore	2.1 x 150mm	<b>1912-3802</b>
	Analytical	4.6 x 50mm	<b>1512-1802</b>
	Analytical	4.6 x 150mm	<b>1512-3802</b>
4000Å, 5µm	Analytical	4.6 x 250mm	<b>1512-5802</b>
	Analytical	4.6 x 50mm	<b>1512-1503</b>
4000Å, 8µm	Microbore	2.1 x 150mm	<b>1912-3803</b>
	Analytical	4.6 x 50mm	<b>1512-1803</b>

### PLRP-S Guard Columns

Packing	i.d. x Length	Qty.	Part No.
PLRP-S, 5µm	3 x 5mm	2	<b>1512-1503</b>
Guard Column Holder		ea	<b>1310-0016</b>

### more info

For more large molecule columns, see pages 84–97.

### related product

Looking for column heaters?  
See page 16–17.



6219



# Shodex® Columns

## Aqueous Size Exclusion

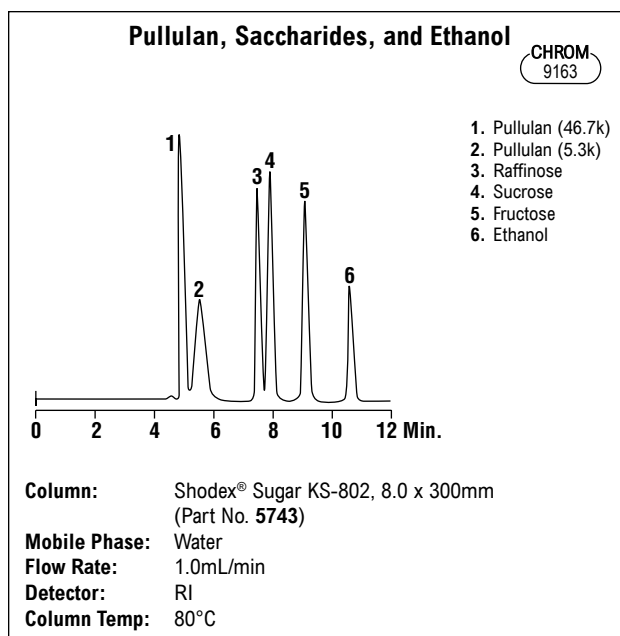
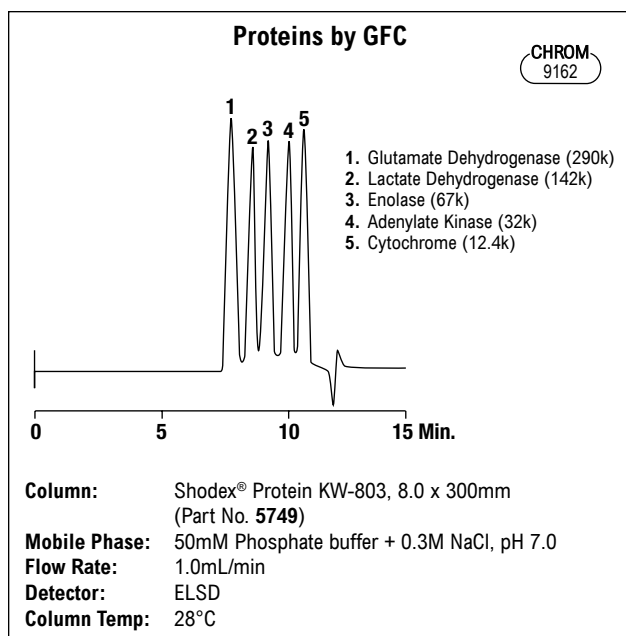
- High efficiency and high mass recovery
- Separate biopolymers by their effective size in solution
- Stable sugar GFC columns

Shodex® Ohpak and Sugar columns are designed for high-resolution separations of water-soluble compounds such as organics, inorganics, oligomers, and polymers. Three different gel filtration size exclusion materials are available.

Shodex® Sugar columns use a sulfonated gel with a sodium counter ion for separation of mono, di, oligo, and polysaccharides, starches, and celluloses.

Aqueous Size Exclusion Columns		
Packing Series	Description	Applications
<b>Ohpak SB-800</b>	Polyhydroxymethacrylate	General purpose GFC of water-soluble polymers, proteins, and enzymes
<b>Protein KW-800</b>	Porous Silica Gel	GFC of proteins, glycoproteins, and peptides
<b>Sugar KS-800</b>	Sulfonated PS Gel (Na <sup>+</sup> counter ion)	Separation of mono, di, oligo, and polysaccharides, starches, and celluloses

hplc columns | small and large molecule



### Shodex® Size Exclusion HPLC Columns

	Particle Size	Format	Packing	MW Range	i.d. x Length	Part No.
<i>Ohpak</i>	8µm	Analytical	Q-801	50–1800	8.0 x 500mm	<b>5737</b>
	8µm	Analytical	SB-802 HQ	50–4000	8.0 x 300mm	<b>5730</b>
	6µm	Analytical	SB-802.5 HQ	50–10,000	8.0 x 300mm	<b>5731</b>
	6µm	Analytical	SB-803 HQ	50–100,000	8.0 x 300mm	<b>5732</b>
	10µm	Analytical	SB-804 HQ	100–1,000,000	8.0 x 300mm	<b>5733</b>
	13µm	Analytical	SB-805 HQ	500–4,000,000	8.0 x 300mm	<b>5734</b>
<i>Protein</i>	13µm	Analytical	SB-806M HQ	100–20,000,000	8.0 x 300mm	<b>5736</b>
	5µm	Analytical	KW-802.5	50–50,000	8.0 x 300mm	<b>5748</b>
	5µm	Analytical	KW-803	50–150,000	8.0 x 300mm	<b>5749</b>
	7µm	Analytical	KW-804	100–600,000	8.0 x 300mm	<b>5750</b>
<i>Sugar</i>	5µm	Analytical	KS-801	50–1000	8.0 x 300mm	<b>5742</b>
	5µm	Analytical	KS-802	50–10,000	8.0 x 300mm	<b>5743</b>
	5µm	Analytical	KS-803	50–50,000	8.0 x 300mm	<b>5744</b>
	7µm	Analytical	KS-804	100–400,000	8.0 x 300mm	<b>5745</b>
	17µm	Analytical	KS-805	100–5,000,000	8.0 x 300mm	<b>5746</b>
	17µm	Analytical	KS-806	500–50,000,000	8.0 x 300mm	<b>5747</b>

### related product

Doing carbohydrate analysis?

ELSD offers greater sensitivity than RI. See pages 5–11.



### related product

Looking for column heaters?

See pages 16 and 17.

# Shodex® ODP2 HP Columns

## High-Efficiency Polymer-Based Reversed-Phase Column

- Column efficiency is comparable with that of silica-based ODS columns
- Better retention of highly polar substances comparing to ODS columns
- Long column life even with high protein content samples: ODP2 HP prevent protein adsorption that causes ODS column degradation
- Excellent peak shape using low salt mobile phase, ideal for microbore
- High pH stability

ODP2 HP series is a polymer-based [poly(hydroxymethacrylate)] column for reversed-phase chromatography. The efficiency of ODP2 HP is improved over most resin-based columns, with typical theoretical plate number >65,000 per meter.

### ODP2 HP Columns

Packing	Format	i.d. x Length	Part No.
ODP2 HP-4B, 5µm	Analytical	4.6 x 50mm	F7622001
ODP2 HP-4D, 5µm	Analytical	4.6 x 150mm	F7622002
ODP2 HP-4E, 5µm	Analytical	4.6 x 250mm	F7622003
ODP2 HPG-4A, 5µm	Analytical	4.6 x 10mm	F6714010
ODP2 HP-2B, 5µm	Analytical	4.6 x 50mm	F7622004
ODP2 HP-2D, 5µm	Analytical	4.6 x 150mm	F7622005
ODP2 HPG-2A, 5µm	Analytical	4.6 x 10mm	F6714011

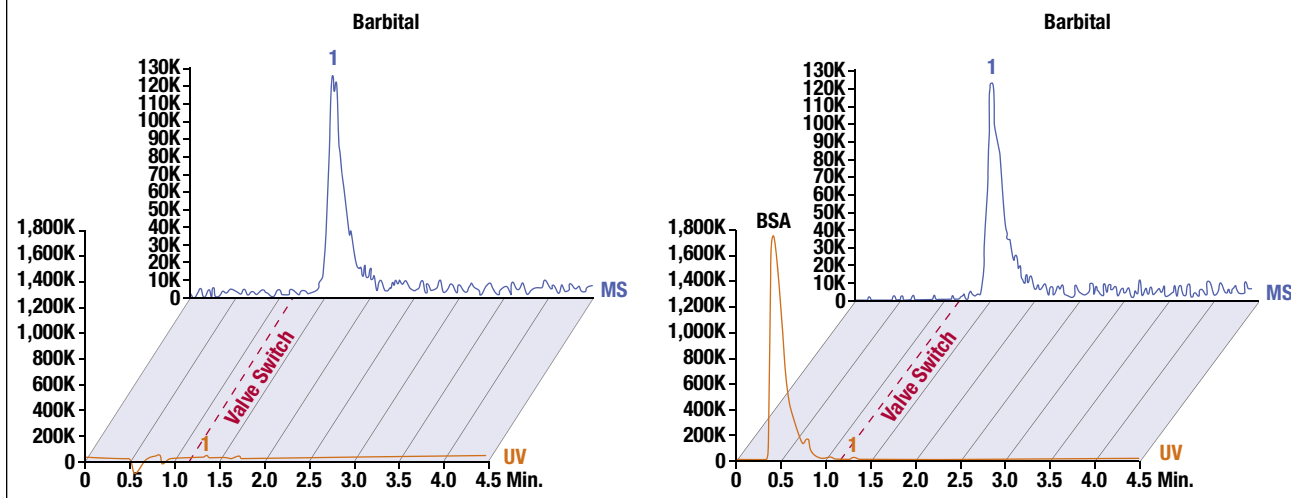
ODP2 HP Columns Specifications					
Packing	Theoretical Plate Number (per column)	Theoretical Plate Number (per meter)	Particle Size	pH Range	i.d. x Length
ODP2 HP-4B	≥3500	70,000	5µm	3–12	4.6 x 50mm
ODP2 HP-4D	≥13,000	86,000	5µm	3–12	4.6 x 150mm
ODP2 HP-4E	≥17,000	68,000	5µm	3–12	4.6 x 250mm
ODP2 HPG-4A	guard column	guard column	5µm	3–12	4.6 x 10mm
ODP2 HP-2B	≥3000	60,000	5µm	3–12	2.0 x 50mm
ODP2 HP-2D	≥7000	46,600	5µm	3–12	2.0 x 150mm
ODP2 HPG-2A	guard column	guard column	5µm	3–12	2.0 x 10mm

hplc columns | large molecule

### Drug in Biological Fluid

Microbore is effective for the high sensitivity analysis of drugs; however, when protein is present and enters the MS (Mass detector), it contaminates the MS or suppresses ionization of the sample. Often pretreatment does not remove protein thoroughly. Drugs in biological fluid are hard to analyze because protein co-elutes with the component of interest. The target drug receives ion suppression from the protein and appears as a small peak.

ODP2 HP can separate the target drug from protein by eluting protein early. The result of barbital analysis with BSA using microbore is shown as below. Barbital was introduced into the MS by a switching valve after BSA was eluted, and barbital was detected without any influence of ion suppression.



### more info

For other Shodex® columns, including KW400, KF-400, SB-800, KF-400, KF-600, KF-800, NH2P, Ion Exchange, affinity, and sugar columns, visit [www.discoverysciences.com](http://www.discoverysciences.com).

## Waters® Spherisorb® Columns

All Waters® columns are packed by Grace to our highest QC standards. Spherisorb® columns have 80Å pores and 220m<sup>2</sup>/g surface area. ODS-1 is unendcapped with a 6% carbon load, and ODS-2 is endcapped with a 12% carbon load.

### Spherisorb® HPLC Columns

Packing	Format	i.d. x Length	Part No.	Waters® Fittings Part No.
ODS-1, 5µm	Analytical	4.6 x 150mm	<b>8441</b>	<b>8443</b>
	Analytical	4.6 x 250mm	<b>8364</b>	<b>8357</b>
ODS-2, 3µm	Analytical	4.6 x 100mm	<b>8487</b>	<b>8489</b>
	Analytical	4.6 x 150mm	<b>8558</b>	<b>8560</b>
ODS-2, 5µm	Analytical	4.6 x 150mm	<b>8545</b>	<b>8547</b>
	Analytical	4.6 x 250mm	<b>8736</b>	<b>8738</b>
Phenyl, 5µm	Analytical	4.6 x 150mm	<b>8689</b>	<b>8691</b>
	Analytical	4.6 x 250mm	<b>8752</b>	<b>8754</b>
Cyano, 5µm	Analytical	4.6 x 150mm	<b>8713</b>	<b>8715</b>
	Analytical	4.6 x 250mm	<b>8361</b>	<b>8362</b>
Amino, 5µm	Analytical	4.6 x 150mm	<b>8739</b>	<b>8741</b>
	Analytical	4.6 x 250mm	<b>8371</b>	<b>8372</b>
Silica, 3µm	Analytical	4.6 x 100mm	<b>8382</b>	<b>8383</b>
	Analytical	4.6 x 150mm	<b>8554</b>	<b>8556</b>
Silica, 5µm	Analytical	4.6 x 150mm	<b>8389</b>	<b>8391</b>
	Analytical	4.6 x 250mm	<b>8376</b>	<b>8377</b>
SAX, 5µm	Analytical	4.6 x 250mm	<b>8765</b>	<b>8767</b>
SCX, 5µm	Analytical	4.6 x 250mm	<b>8888</b>	<b>8889</b>

### Spherisorb® All-Guard™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
ODS-1, 5µm	4.6 x 7.5mm	3	<b>96218</b>
ODS-2, 5µm	4.6 x 7.5mm	3	<b>96219</b>
Phenyl, 5µm	4.6 x 7.5mm	3	<b>96226</b>
Cyano, 5µm	4.6 x 7.5mm	3	<b>96225</b>
Amino, 5µm	4.6 x 7.5mm	3	<b>96224</b>
Silica, 5µm	4.6 x 7.5mm	3	<b>96227</b>
SAX, 5µm	4.6 x 7.5mm	3	<b>96228</b>
SCX, 5µm	4.6 x 7.5mm	3	<b>96217</b>
All-Guard™ Cartridge Holder		ea	<b>80101</b>

(Includes Direct-Connect Column Coupler)

\*All-Guard™ holder required. Other particle sizes available.

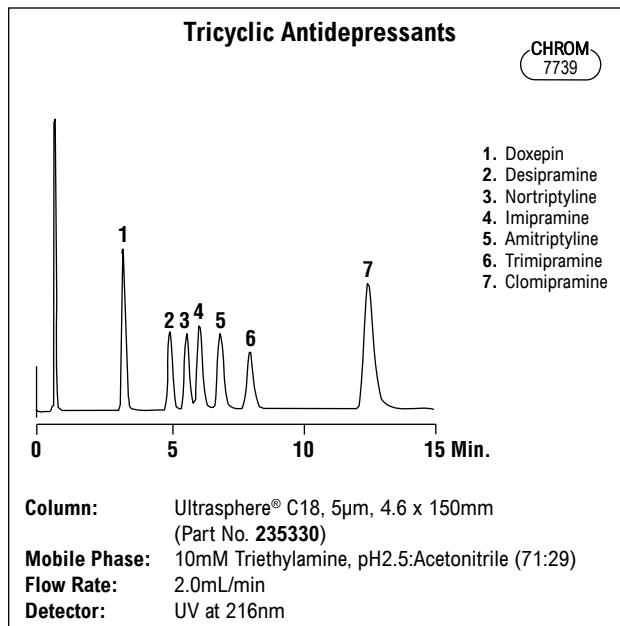
### more info

If you like Spherisorb®, try Grace's lower cost Allsphere™ on page 59.

## Beckman® Ultrasphere® Columns

- Low metal content for symmetrical peaks
- Narrow particle size range for high efficiency
- Maximum surface coverage for long column lifetimes

All Ultrasphere® columns are packed by Grace to our highest QC standards. Ultrasphere® columns are highly endcapped to reduce silanol interactions and have a narrow particle size range for excellent resolving power.



### Ultrasphere® HPLC Columns

Packing	Format	i.d. x Length	Part No.
C18, 3µm	Analytical	4.6 x 75mm	<b>244254</b>
C18, 5µm	Microbore	2.0 x 150mm	<b>237390</b>
	Microbore	2.0 x 250mm	<b>244434</b>
	Analytical	4.6 x 150mm	<b>235330</b>
	Analytical	4.6 x 250mm	<b>235329</b>
C18-IP, 5µm	Prep	10 x 250mm	<b>235328</b>
	Analytical	4.6 x 150mm	<b>235334</b>
C8, 5µm	Analytical	4.6 x 250mm	<b>235335</b>
	Analytical	4.6 x 150mm	<b>235333</b>
Cyano, 5µm	Analytical	4.6 x 250mm	<b>235332</b>
	Analytical	4.6 x 150mm	<b>244070</b>
Silica, 5µm	Analytical	4.6 x 250mm	<b>244071</b>
	Analytical	4.6 x 150mm	<b>235342</b>
Analytical	4.6 x 250mm	<b>235341</b>	

### Ultrasphere® Guard Columns

Description	i.d. x Length	Qty.	Part No.
C18, 5µm	4.6 x 45mm	ea	<b>243536</b>
C18-IP, 5µm	4.6 x 45mm	ea	<b>243534</b>
C8, 5µm	4.6 x 45mm	ea	<b>243532</b>
Cyano, 5µm	4.6 x 45mm	ea	<b>243538</b>
Silica, 5µm	4.6 x 45mm	ea	<b>243530</b>

Ultrasphere® guard columns connect directly to the analytical column with a zero dead volume connector, or a small piece of tubing with finger tight fittings. No holder required.

## ZirChrom® Columns

- Better pH and thermal stability than silica-based columns
- More efficient than polymer-based columns
- Widest range of reversed-phase selectivities

ZirChrom Separations, Inc. produces HPLC columns based on 3µm zirconia (zirconium oxide) particles. These columns are more rugged and durable than silica-based columns and more efficient than polymer-based columns. ZirChrom® normal-phase and reversed-phase columns can be used across the entire pH range (1–14) and are thermally stable to 200°C. Additionally, zirconia's silanol-free surface produces sharp, symmetrical peaks for amines without mobile phase modifiers.

ZirChrom® Packings		
Packing	Functional Group	Mode
<b>DiamondBond™-C18</b>	Octadecylsilane	Reversed-Phase
<b>PBD</b>	Polybutadiene	Reversed-Phase & Secondary Ionic
<b>PS</b>	Polystyrene	Reversed-Phase (Low Retention)
<b>CARB</b>	Graphitic Carbon	Reversed-Phase (High Retention)
<b>PHASE</b>	Zirconia	Normal-Phase
<b>EZ</b>	—	Reversed-Phase
<b>MS</b>	—	Reversed-Phase

- **DiamondBond®-C18** — ideal for microbore applications and acidic compounds. pH range 1–14
- **ZirChrom®-PBD** — for general purpose applications and basic compounds; similar to ODS for non-electrolytes. pH range 1–14
- **ZirChrom®-PS** — ideal for highly aqueous mobile phases; an alternative to ODS selectivity. pH range 1–14
- **ZirChrom®-CARB** — for diastereomers/geometric isomers; greatest difference in selectivity compared to ODS. pH range 1–14
- **ZirChrom®-Phase** — the bare zirconia particle. The columns are used as a normal-phase alternative to silica. pH range 1–14
- **ZirChrom®-EZ** — unique selectivity with mobile phase selectivity. pH range 1–10
- **ZirChrom®-MS** — low column bleed makes it ideal for microbore applications. pH range 1–10

ZirChrom® Specifications	
<b>Pore Size</b>	300Å
<b>Particle Size</b>	3µm, 5µm
<b>Surface Area</b>	30m <sup>2</sup> /g
<b>pH Range</b>	1–14 (EZ and MS 1–10)
<b>Max. Temperature</b>	200°C

### EZ and MS HPLC Columns

- Unique selectivity on a zirconia platform
- Mobile phase flexibility, including microbore compatible buffers
- Stable from pH 1–10

The deactivation of Lewis acid sites on the zirconia surface allows for the chromatography of Lewis base analytes using volatile mobile phase additives, including conventional microbore compatible buffers such as acetate and formate.

#### ZirChrom® HPLC Columns

Packing	Format	i.d. x Length	Part No.
<i>DiamondBond®</i> , 3µm	Microbore	2.1 x 150mm	<b>DB01-1521</b>
	Analytical	4.6 x 150mm	<b>DB01-1546</b>
<i>PBD</i> , 3µm	Analytical	4.6 x 50mm	<b>ZR03-0546</b>
	Analytical	4.6 x 150mm	<b>ZR03-1546</b>
<i>PS</i> , 3µm	Microbore	2.1 x 150mm	<b>ZR09-1521</b>
	Analytical	4.6 x 150mm	<b>ZR09-1546</b>
<i>CARB</i> , 3µm	Analytical	4.6 x 150mm	<b>ZR01-1546</b>
<i>PHASE</i> , 3µm	Microbore	2.1 x 100mm	<b>ZR02-1021</b>
	Microbore	2.1 x 150mm	<b>ZR02-1521</b>
	Analytical	4.6 x 100mm	<b>ZR02-1046</b>
<i>EZ</i> , 3µm	Analytical	4.6 x 150mm	<b>ZR02-1546</b>
	Microbore	2.1 x 50mm	<b>EZ01-0521</b>
<i>MS</i> , 3µm	Analytical	4.6 x 50mm	<b>MS01-0546</b>

# Vydac® Large Molecule Columns

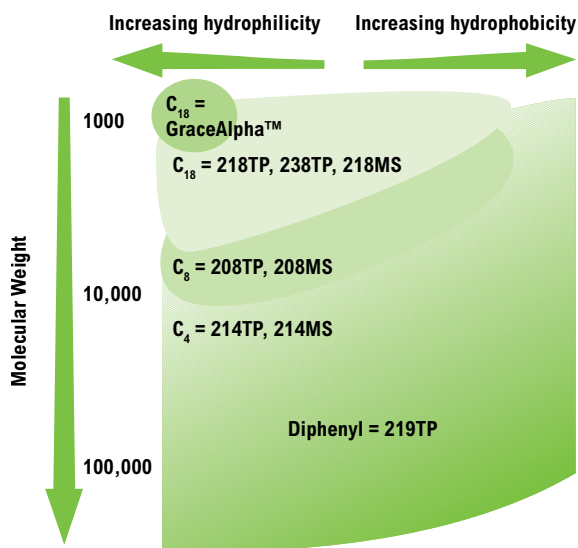
Vydac® has always been a trusted name in bioseparations, now, with technology acquired by Grace over the past few years, we have expanded this expertise further. New Grace® large molecule columns range from nano, capillary to micro, analytical to preparative columns.

Separate biomolecules from small peptides to large intact proteins with the Vydac® family of products which includes reversed-phase, normal-phase, ion-exchange, and affinity phases. Our extensive applications library offers solid method development guidance, and our technical experts provide insight to even the most unusual separation challenges. Whether your primary analysis consideration is speed, MS compatibility, resolution, or recovery, we have a solution.

## Column Selection for Polypeptides

The reversed-phase column for a polypeptide separation should be selected based on the hydrophobicity of the polypeptide being chromatographed and molecular weight as a secondary consideration.

hplc columns | large molecule



Phase	Simple Enzymatic Digests (<12 proteins)	Complex Enzymatic Digests (>12 proteins)	Biomolecules 0-5K MW	Biomolecules 5-10K MW	Biomolecules >10K MW	Un-denatured, Intact Proteins	Antibodies	Oligonucleotides	Oligosaccharides	Comments
<b>218MS (C18)</b> See page 85–87	●		●							Polymeric bonding highest hydrophobic interaction and unique geometric selectivity
<b>238MS (C18)</b> See page 85–87	◐		●							Monomeric bonding offers increased peptide interaction and generally yields higher peak counts. Different selectivity compared to 218MS.
<b>208MS (C8)</b> See page 85–87				●				◐		Lower hydrophobicity is better for larger molecules
<b>214MS (C4)</b> See page 85–87					●	●	●	●		Ideal for hydrophobic proteins, or when minimal organic is desired
<b>219MS (Diphenyl)</b> See page 85–87			◐	◐	◐		◐			Lowest capacity, highly selective for proteins with aromatic sidechains
<b>Everest® C18</b> See page 88–89		●							●	Maximum surface coverage for highest resolution of complex samples
<b>ProZap™</b> See page 93–94				◐	●	●	●	●	●	Sub 2µm, in Expedite™ format optimized for fast analysis
<b>218TP (C18)</b> See page 90–92	◐		◐							First generation media with extensive applications library
<b>214TP (C4)</b> See page 90–92					◐	◐	◐			First generation media with extensive applications library

### related products

Looking for large molecule prep columns?  
See pages 156–161.

# Vydac® MS Introduction

## New Generation Columns with Unsurpassed Resolution, Sensitivity, and Recovery

- Unique selectivity reveals peaks otherwise masked by other C18 columns
- Excellent peak shape with little or no TFA
- High protein recoveries make scale-up easy

Vydac® MS columns are the latest development in the ongoing effort to provide the best reversed-phase HPLC columns for biomolecule. A surface treatment and proprietary bonding process gives Vydac® MS columns a unique selective not found anywhere else. A variety of reversed phases makes this product line suitable for small peptides to large intact, undenatured proteins.



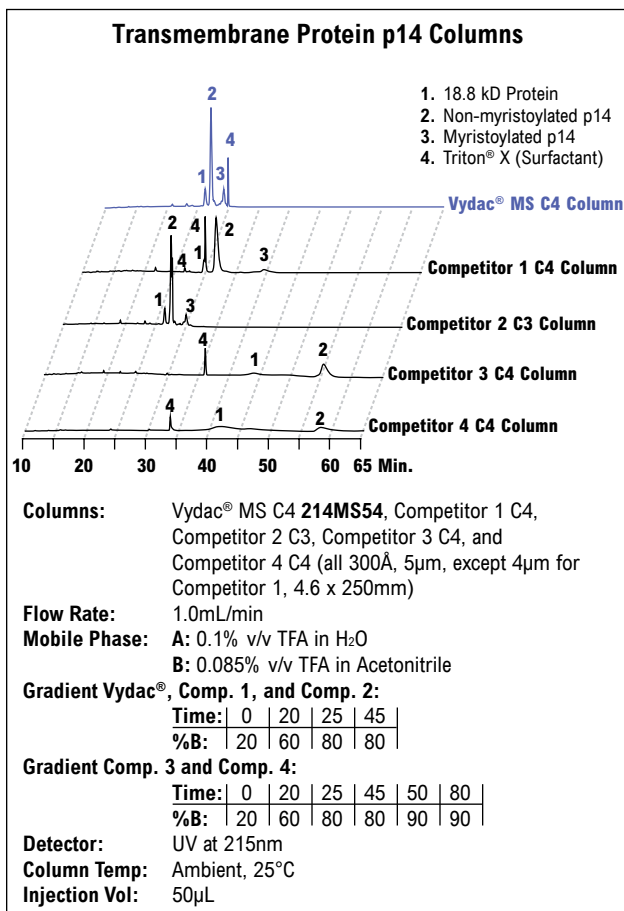
7300

hplc columns | large molecule

MS Specifications									
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
208MS C8	Silica	Spheroidal	5µm	300Å	70m <sup>2</sup> /g	5%	Polymeric	Yes	L7
214MS C4	Silica	Spheroidal	5µm	300Å	70–110m <sup>2</sup> /g	3%	Polymeric	Yes	L26
218MS C18	Silica	Spheroidal	3, 5, 10, 10–15µm	300Å	60–110m <sup>2</sup> /g	8%	Polymeric	Yes	L1
238MS C18	Silica	Spheroidal	5µm	300Å	70m <sup>2</sup> /g	4%	Monomeric	Yes	L1
219MS Di-Phe	Silica	Spheroidal	5µm	300Å	70m <sup>2</sup> /g	4%	Polymeric	Yes	—

### Unique Selectivity

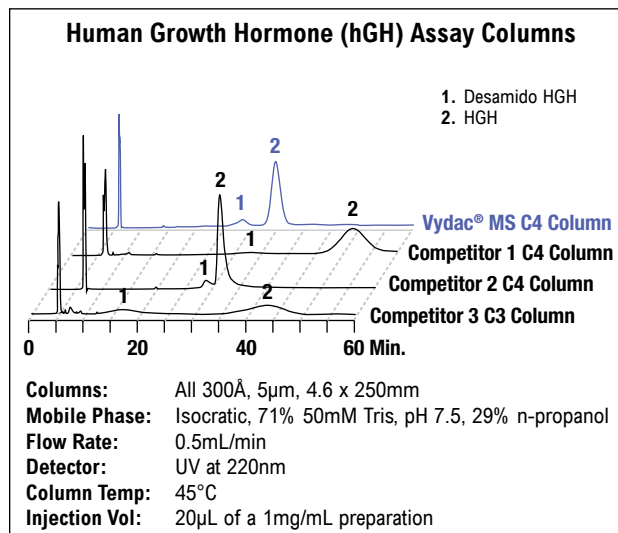
A sample of bovine fetuin, a 36kD glycoprotein, was digested with trypsin. Some of the sample components interfere with the peptide separation on the Competitor 1 and Competitor 2 columns and appear as a chromatographic “hump” with peaks riding on top. The unique selectivity of Vydac® MS columns solves these separation problems



Reptilian reovirus RRV p14 sample courtesy of Drs. Roberto J. de Antueno and Roy Duncan, Dalhousie University, Halifax, Nova Scotia.

### Unsurpassed Resolution and Peak Symmetry

Vydac® MS C4 columns provide the overall best performance for hGH and desamido hGH analysis. Competitive columns show significant, undesirable interaction of hGH with the stationary phase.



#### more info

For additional protein and peptide applications, see application section pages 429–441.

#### more applications

To view our complete searchable chromatogram database visit [www.discoverysciences.com/chromdb/](http://www.discoverysciences.com/chromdb/)

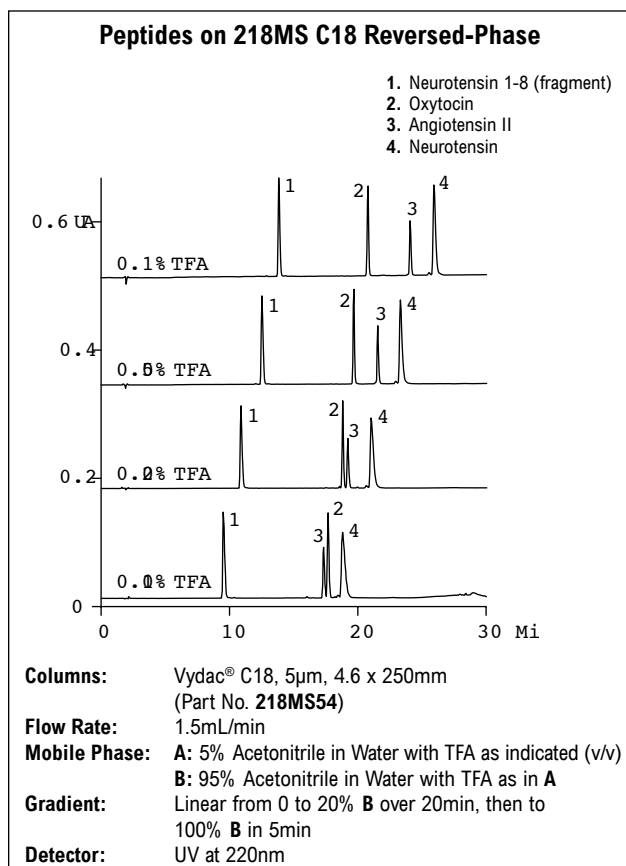




# Vydac® MS Columns

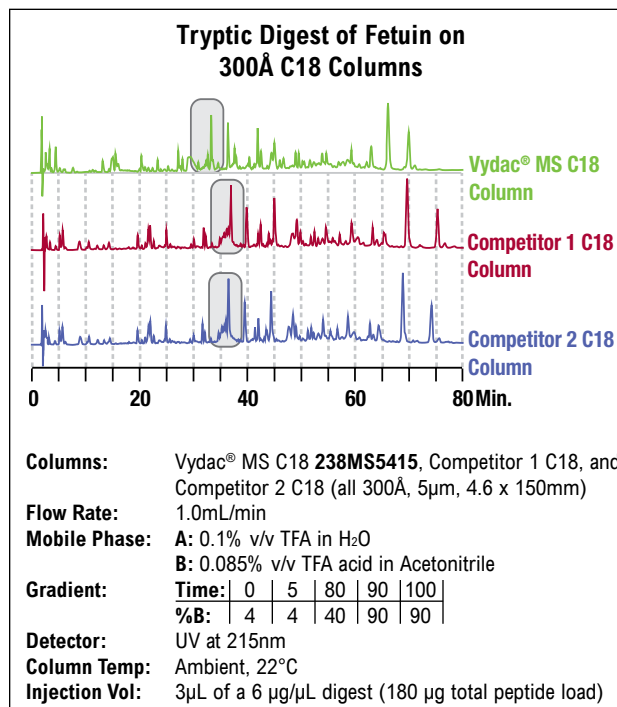
## Excellent Peak Shape with Little or No TFA

It is common practice for protein and peptide separations to include an acidic modifier such as TFA in the mobile phase. TFA masks basic entities, reducing mixed-mode retention, and improving peak symmetry. TFA also changes retention and selectivity for different analytes, and its concentration can be adjusted to optimize a separation. Unfortunately TFA is UV absorbent and contributes background at low UV wavelengths. Also It is especially problematic with electrospray MS where it interferes with ion generation, called "quenching", and reduces MS sensitivity.



## Hydrophobic Proteins

Transmembrane proteins are hydrophobic proteins which bind to cell membranes and are particularly difficult to separate. Vydac® MS columns provide excellent selectivity and peak shape for these molecules. In this case, a hydrophobic transmembrane protein was separated from a synthetic myristoylated derivative and other cellular components.

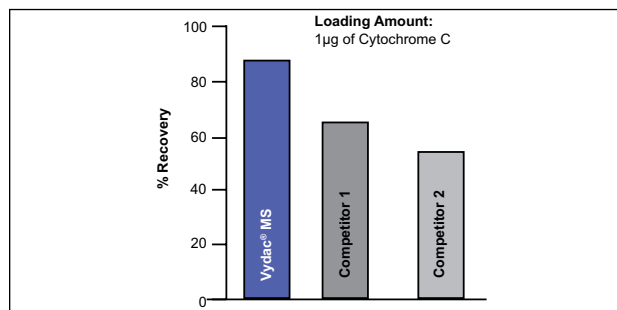


The Vydac® column provides better separation and recovery for a highly hydrophobic membrane protein (RRV p14) and its fatty acid modified (myristoylated) form, a component of a potentially new vaccine delivery system.

## High Protein Recovery for Higher Sensitive, Ideal for Preparative Chromatography

Surface chemistry reduces adsorption of proteins for higher recoveries and also increases mass loading.

### % Recovery at Low Protein Load: Vydac® MS C4 vs. 2 Competitors



Vydac® MS C4 column provides more than 20% more loading of Cytochrome C.

### more applications

To view our complete searchable chromatogram database visit [www.discoverysciences.com/chromdb/](http://www.discoverysciences.com/chromdb/)





# Vydac® MS Columns

## Vydac® MS Analytical Columns

Particle Size	Columns					Recommended Guards	
	i.d.	50mm	100mm	150mm	250mm	Guard Kit <sup>1</sup>	Guard Cartridge <sup>2</sup>
<b>214 MS C4</b>							
5µm	1.0mm	214MS5105	214MS5110	214MS5115	214MS51	214GK51MS	214GD51MS
	2.1mm	214MS5205	214MS5210	214MS5215	214MS52	214GK52MS	214GD52MS
	3.2mm	—	—	—	214MS53	214GK54MS	214GD54MS
	4.6mm	214MS5405	214MS5410	214MS5415	214MS54	214GK54MS	214GD54MS
<b>208 MS C8</b>							
5µm	1.0mm	208MS5105	208MS5110	208MS5115	208MS51	208GK51MS	208GD51MS
	2.1mm	208MS5205	208MS5210	208MS5215	208MS52	208GK52MS	208GD52MS
	3.2mm	—	—	—	208MS53	208GK54MS	208GD54MS
	4.6mm	208MS5405	208MS5410	208MS5415	208MS54	208GK54MS	208GD54MS
<b>218 MS Polymeric C18</b>							
5µm	1.0mm	218MS5105	218MS5110	218MS5115	218MS51	218GK51MS	218GD51MS
	2.1mm	218MS5205	218MS5210	218MS5215	218MS52	218GK52MS	218GD52MS
	3.2mm	—	—	—	218MS53	218GK54MS	218GD54MS
	4.6mm	218MS5405	218MS5410	218MS5415	218MS54	218GK54MS	218GD54MS
<b>238 MS Monomeric C18</b>							
5µm	1.0mm	238MS5105	238MS5110	238MS5115	238MS51	238GK51MS	238GD51MS
	2.1mm	238MS5205	238MS5210	238MS5215	238MS52	238GK52MS	238GD52MS
	3.2mm	—	—	—	238MS53	238GK54MS	238GD54MS
	4.6mm	238MS5405	238MS5410	238MS5415	238MS54	238GK54MS	238GD54MS
<b>219 MS Diphenyl</b>							
5µm	1.0mm	219MS5105	219MS5110	219MS5115	219MS51	219GK51MS	219GD51MS
	2.1mm	219MS5205	219MS5210	219MS5215	219MS52	219GK52MS	219GD52MS
	3.2mm	—	—	—	219MS53	219GK54MS	219GD54MS
	4.6mm	219MS5405	219MS5410	219MS5415	219MS54	219GK54MS	219GD54MS

<sup>1</sup>A guard kit includes a holder and one guard cartridge; <sup>2</sup>Guard cartridge units include two guard cartridges.

## Vydac® MS Nano and Capillary Columns

	i.d.	50mm	100mm	150mm	250mm
<b>214 MS C4</b>					
5µm	75µm	214MS5.07505	214MS5.07510	214MS5.07515	214MS5.07525
	150µm	214MS5.1505	214MS5.1510	214MS5.1515	214MS5.1525
	300µm	214MS5.305	214MS5.310	214MS5.315	214MS5.325
	500µm	214MS5.505	214MS5.510	214MS5.515	214MS5.525
<b>208 MS C8</b>					
5µm	75µm	208MS5.07505	208MS5.07510	208MS5.07515	208MS5.07525
	150µm	208MS5.1505	208MS5.1510	208MS5.1515	208MS5.1525
	300µm	208MS5.305	208MS5.310	208MS5.315	208MS5.325
	500µm	208MS5.505	208MS5.510	208MS5.515	208MS5.525
<b>218 MS Polymeric C18</b>					
3µm	75µm	218MS3.07505	218MS3.07510	218MS3.07515	218MS3.07525
	150µm	218MS3.1505	218MS3.1510	218MS3.1515	218MS3.1525
	300µm	218MS3.305	218MS3.310	218MS3.315	218MS3.325
	500µm	218MS3.505	218MS3.510	218MS3.515	218MS3.525
5µm	75µm	218MS5.07505	218MS5.07510	218MS5.07515	218MS5.07525
	150µm	218MS5.1505	218MS5.1510	218MS5.1515	218MS5.1525
	300µm	218MS5.305	218MS5.310	218MS5.315	218MS5.325
	500µm	218MS5.505	218MS5.510	218MS5.515	218MS5.525
<b>238 MS Monomeric C18</b>					
5µm	75µm	238MS5.07505	238MS5.07510	238MS5.07515	238MS5.07525
	150µm	238MS5.1505	238MS5.1510	238MS5.1515	238MS5.1525
	300µm	238MS5.305	238MS5.310	238MS5.315	238MS5.325
	500µm	238MS5.505	238MS5.510	238MS5.515	238MS5.525
<b>219 MS Diphenyl</b>					
5µm	75µm	219MS5.07505	219MS5.07510	219MS5.07515	219MS5.07525
	150µm	219MS5.1505	219MS5.1510	219MS5.1515	219MS5.1525
	300µm	219MS5.305	219MS5.310	219MS5.315	219MS5.325
	500µm	219MS5.505	219MS5.510	219MS5.515	219MS5.525

## Vydac® MS Guard Cartridges

Packing	i.d. x Length	Qty.	Part No.
C18 Polymeric, 5µm*	0.150 x 10mm	ea	218MS5C0115
Capillary Guard**	0.300 x 10mm	ea	218MS5C0130
	1.0 x 10mm	2	218GD51MS
C4, 5µm* Capillary Guard**	0.150 x 10mm	ea	214MS5C0115
	0.300 x 10mm	ea	214MS5C0130
	1.0 x 10mm	2	214GD51MS

## Vydac® MS Guard Cartridges (continued)

Packing	Qty.	Part No.
Capillary Guard Cartridge Holder		
Guard Holder for 0.100mm and 0.150mm Guards	ea	GR-3710E
Guard Holder for 0.300mm and 0.500mm Guards	ea	GR-3710A
Guard Holder for 1mm Guards	ea	GCH1

\*All-Guard™ holder required. Other particle sizes available.  
\*\*1.5µm and 5µm particles and other dimensions are available.



# Vydac® Everest® Columns Introduction



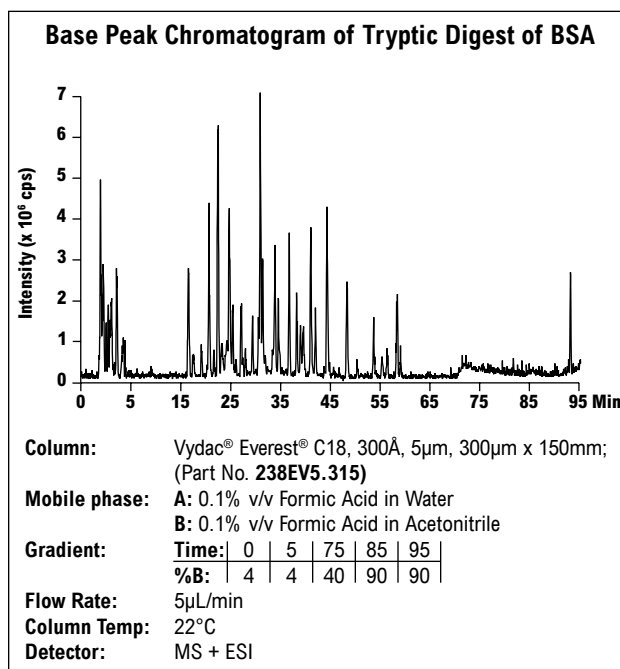
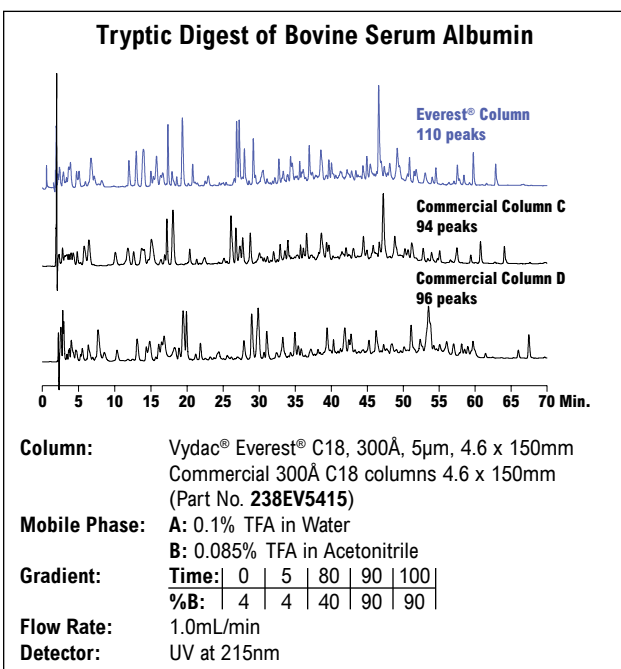
## High Resolution for Complex Peptide Samples

- High resolution of complex peptide digests
- Unique selectivity for both hydrophilic and hydrophobic peptides
- Exceptional microbore sensitivity with little or no TFA in the mobile phase

Everest® columns provide exceptionally high resolution for complex peptide digest separations. Unique selectivity and sensitivity are the result of new bonding technology that improves C18 surface coverage and deactivates residual silanols. Previously, the best 300Å C18 chemistries have had carbon coverage in the 2.8 to 3.6µmol/m<sup>2</sup> range. Everest® C18 coverage is in excess of 4µmol/m<sup>2</sup> and approximates the theoretical limit based on surface area. This increased shielding of the base silica increases column life and reduces the amount of TFA required to shield the silica.

Everest® Specifications									
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
238EV C18	Silica	Spheroidal	5, 10, 10–15, 15–20µm	300Å	70–110m <sup>2</sup> /g	6%	Monomeric	Yes	L1

hplc columns | large molecule



Everest® columns outperform competitor columns at higher peptide loads, by providing higher-resolution separations (average of 17% higher peak counts than competitor columns tested).

The Everest® column performs exceptionally well with no TFA in the mobile phase, ensuring excellent microbore sensitivity.

### Everest® 300Å C18

Particle Size	i.d.	Columns				Recommended Guards	
		50mm	100mm	150mm	250mm	Guard Kit <sup>1</sup>	Guard Cartridge <sup>2</sup>
<b>Everest® Analytical Columns 238EV C18</b>							
5µm	1.0mm <sup>3</sup>	238EV5105	238EV5110	238EV5115	238EV51	238GK51EV	238GD51EV
	2.1mm <sup>3</sup>	238EV5205	238EV5210	238EV5215	238EV52	238GK52EV	238GD52EV
	4.6mm <sup>3</sup>	238EV5405	238EV5410	238EV5415	238EV54	238GK54EV	238GD54EV
<b>Everest® Capillary Columns 238ZU C18</b>							
5µm	75µm	238EV5.07505	238EV5.07510	238EV5.07515	238EV5.07525	—	—
	150µm	238EV5.1505	238EV5.1510	238EV5.1515	238EV5.1525	—	—
	300µm	238EV5.305	238EV5.310	238EV5.315	238EV5.325	—	—
	500µm	238EV5.505	238EV5.510	238EV5.515	238EV5.525	—	—

<sup>1</sup>A guard kit includes a holder and one guard cartridge. <sup>2</sup>Guard cartridge units include two guard cartridges. <sup>3</sup>Titanium frits are standard in column diameters 4.6mm and smaller.

### Everest® Guard Cartridges

Packing	i.d. x Length	Qty.	Part No.
C18, 5µm* Capillary Guard**	0.150 x 10mm	ea	238EV5C0115
	0.300 x 10mm	ea	238EV5C0130
	1.0 x 10mm	2	238GD51EV

\*All-Guard™ holder required. Other particle sizes available.  
\*\*1.5µm and 5µm particles and other dimensions are available.

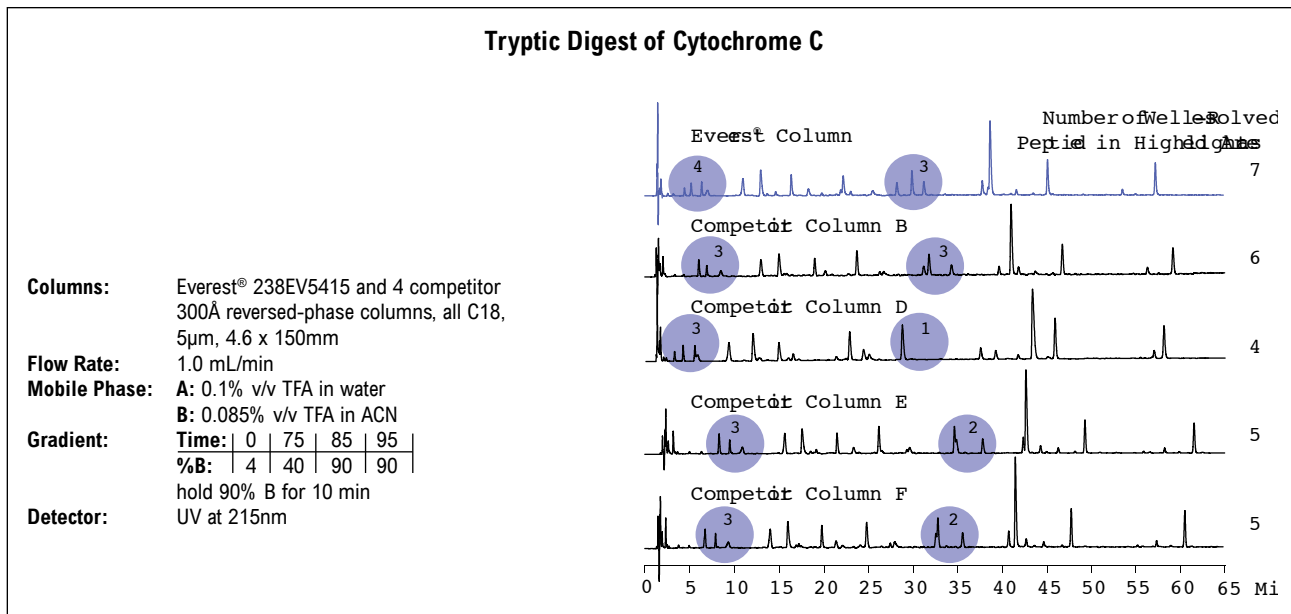
### Everest® Guard Cartridges (continued)

Packing	Qty.	Part No.
<i>Capillary Guard Cartridge Holder</i>		
Guard Holder for 0.100mm and 0.150mm Guards	ea	GR-3710E
Guard Holder for 0.300mm and 0.500mm Guards	ea	GR-3710A
Guard Holder for 1mm Guards	ea	GCH1

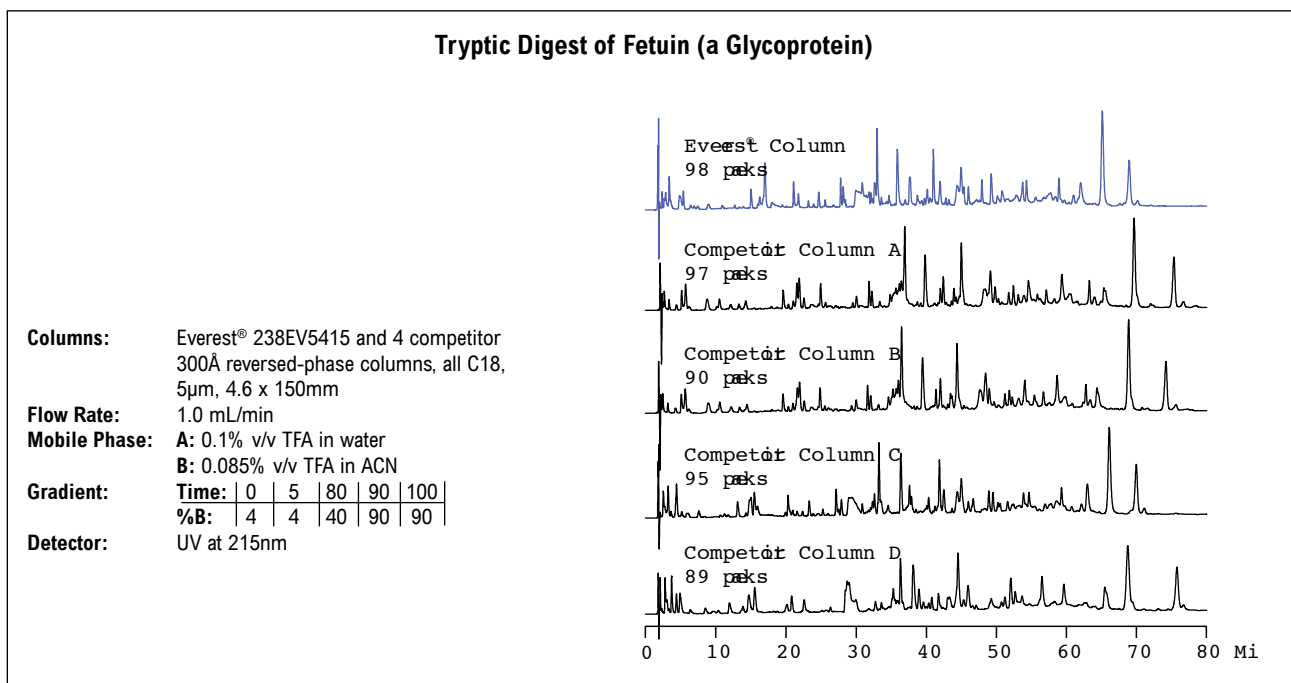


# Vydac® Everest® Columns

hplc columns | large molecule



For a tryptic digest of Cytochrome C, an Everest® column offers unique selectivity which allows the best separation of a group of hydrophilic and hydrophobic peptides. To assess resolution, chromatograms of tryptic digests of several proteins on an Everest® column and several other commercial 300Å C18 reversed-phase columns were compared. Peak counts were based on detection by automated chromatography software with parameters set identically for all columns. In the analyses of a tryptic digest of cytochrome c, specific regions of the chromatogram were examined for the number of peaks resolved. The Everest® column demonstrated unique selectivity for both hydrophilic and hydrophobic peptides.



A tryptic digest of fetuin injected at high load on an Everest® column provided higher peak counts compared to four commercial columns. Peak numbers shown are the average of three separations on each column.

## more applications

To view our complete searchable chromatogram database visit [www.discoverysciences.com/chromdb/](http://www.discoverysciences.com/chromdb/)



# Vydac® TP Columns

VYDAC



7110

## Industry Standard for Polypeptide Separations

- Referred in over 9000 patents, Vydac® 300Å TP is the industry-standard, for peptide, protein, and large molecule separations
- Polymeric bonded phases have exceptionally long column lifetime and negligible phase leaching
- Extensive applications library based on over two decade's experience

Vydac® TP reversed-phase material consists of aliphatic groups bonded to the surface of 300Å pore diameter silica. The large pores of the 300Å TP silica give polypeptide molecules complete access to the interior of the silica pores. The unique process by which we manufacture Vydac® TP silica results in high-purity, synthetic silica with carefully controlled characteristics. Vydac® TP silica is the standard that has defined large pore HPLC silica for polypeptide separations for nearly two decades.

Vydac® TP Columns										
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code	
101TP Sil	Silica	Spheroidal	5, 10, 10–15, 15–20µm	300Å	70–110m <sup>2</sup> /g	—	unbonded	—	L3	
201TP C18	Silica	Spheroidal	5, 7, 10, 10–15, 15–20µm	300Å	70–90m <sup>2</sup> /g	8%	Polymeric	No	L1	
202TP C18	Silica	Spheroidal	3, 5, 10µm	300Å	60–90m <sup>2</sup> /g	9%	Polymeric	No	L1	
208TP C8	Silica	Spheroidal	3, 5, 7, 10, 10–15, 15–20µm	300Å	60–110m <sup>2</sup> /g	5%	Polymeric	Yes	L7	
214TP C4	Silica	Spheroidal	3, 5, 7, 10, 10–15, 15–20µm	300Å	60–110m <sup>2</sup> /g	3%	Polymeric	Yes	L26	
218TP C18	Silica	Spheroidal	3, 5, 7, 10, 10–15, 15–20µm	300Å	60–110m <sup>2</sup> /g	8%	Polymeric	Yes	L1	
219TP Di-Phe	Silica	Spheroidal	3, 5, 7, 10, 10–15, 15–20µm	300Å	60–110m <sup>2</sup> /g	4%	Polymeric	Yes	—	
238TP C18	Silica	Spheroidal	3, 5, 7, 10, 10–15, 15–20µm	300Å	60–110m <sup>2</sup> /g	4%	Monomeric	Yes	L1	

## Vydac® 218TP C18 Columns

Vydac® 218TP is a polymerically bonded endcapped n-octadecyl reversed-phase based on 300Å TP silica.

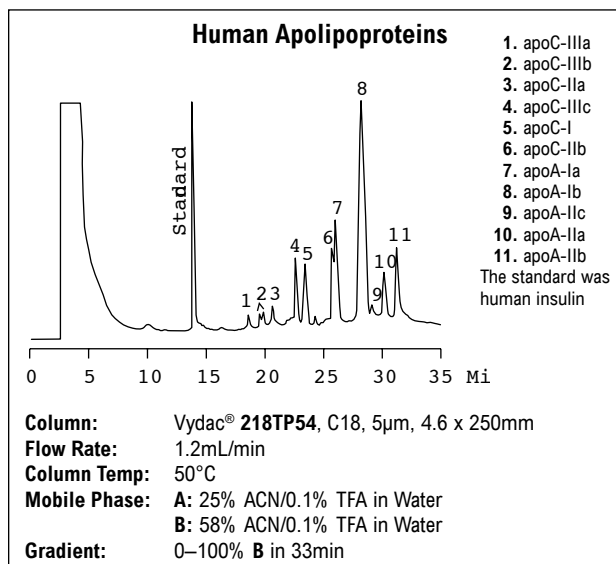
### Applications

Vydac® 218TP reversed-phase columns are recommended for the separation of:

- Small polypeptides less than 4000–5000 MW
- Enzymatic digest fragments
- Natural and synthetic peptides
- Multi-ring compounds

Specific examples include:

- Tryptic digests
- *S. aureus* V8 digests
- Synthetic peptides
- Natural peptides
- Peptide studies



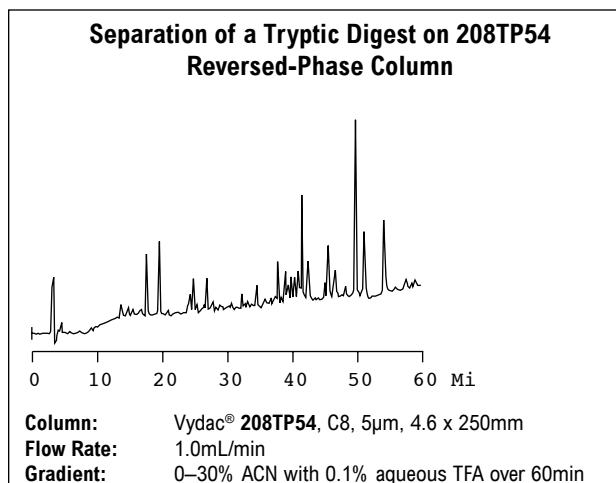
## Vydac® 208TP C8 Reversed-Phase

Vydac® 208TP is a polymerically bonded endcapped n-octyl reversed-phase based on 300Å TP silica.

### Applications

Vydac® 208TP reversed-phase columns are recommended for the separation of:

- Polypeptides up to 10,000–20,000 MW
- Enzymatic digest fragments
- Natural and synthetic peptides

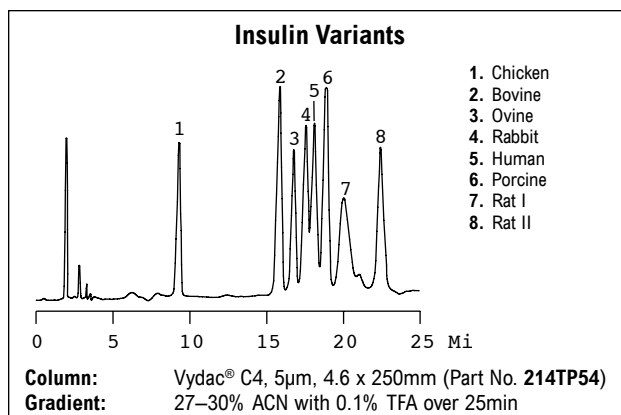


### Vydac® 214TP C4

Vydac® 214TP is a polymerically bonded endcapped n-butyl reversed-phase based on 300Å TP silica. 214ATP is a less extensively endcapped C4 that has been found more suitable for resolution of degradation products in analysis of biosynthetic human growth hormone.

#### Applications

- Glycoproteins
- Hemoglobin variants
- Histones
- Human growth hormone
- Insulin variants
- Membrane proteins



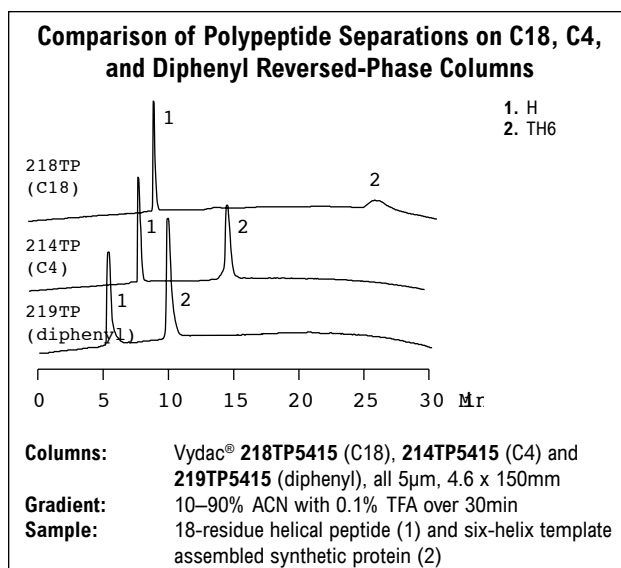
From J. Rivier and R. McClintock, *J. Chrom.* 268, 112-119 (1983).

### Vydac® 219TP Diphenyl Reversed-Phase

Vydac® 219TP is a polymerically bonded endcapped diphenyl reversed-phase based on 300Å TP silica. It combines moderate retentivity with unique selectivity.

#### Applications

- Polypeptides with aromatic side chains
- Large, hydrophobic proteins
- Membrane-spanning peptides
- Lipid peptides
- Fusion proteins from inclusion bodies



### Vydac® 238TP C18 Reversed-Phase

Vydac® 238TP is a monomerically bonded endcapped n-octadecyl reversed-phase based on 300Å TP silica.

#### Applications

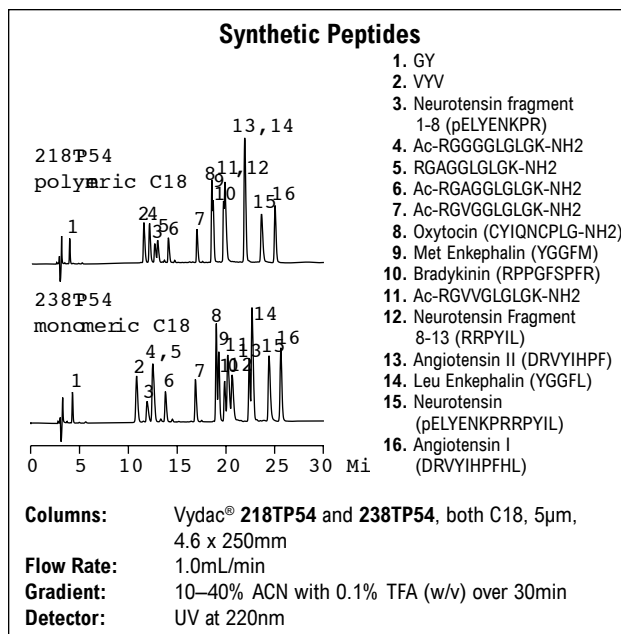
Monomerically bonded C18 provides an alternative to 218TP polymeric C18 with subtle differences in selectivity. The combination of these adsorbents can reveal analytes that may be hidden on a single C18 column.

#### more info

For more protein and peptide applications, see the application section pages 429–441.

#### more applications

To view our complete searchable chromatogram database visit [www.discoverysciences.com/chromdb/](http://www.discoverysciences.com/chromdb/)



# Vydac® TP Columns

## Vydac® TP Analytical Columns

Particle Size	Columns					Recommended Guards	
	i.d.	50mm	100mm	150mm	250mm	Guard Kit <sup>1</sup>	Guard Cartridge <sup>2</sup>
<b>218TP C18</b>							
3µm	4.6mm	218TP3405	218TP3410	—	—	218GK34	218GD34
5µm	1.0mm	218TP5105	218TP5110	218TP5115	218TP51	218GK51	218GD51
	2.1mm	218TP5205	218TP5210	218TP5215	218TP52	218GK52	218GD52
	3.2mm	218TP5305	218TP5310	218TP5315	218TP53	218GK54	218GD54
	4.6mm	218TP5405	218TP5410	218TP5415	218TP54	218GK54	218GD54
<b>208TP C8</b>							
3µm	4.6mm	208TP3405	208TP3410	—	—	208GK34	208GD34
5µm	1.0mm	208TP5105	208TP5110	208TP5115	208TP51	208GK51	208GD51
	2.1mm	208TP5205	208TP5210	208TP5215	208TP52	208GK52	208GD52
	3.2mm	208TP5305	208TP5310	208TP5315	208TP53	208GK54	208GD54
	4.6mm	208TP5405	208TP5410	208TP5415	208TP54	208GK54	208GD54
<b>214TP C4</b>							
3µm	4.6mm	214TP3405	214TP3410	—	—	214GK34	214GD34
5µm	1.0mm	214TP5105	214TP5110	214TP5115	214TP51	214GK51	214GD51
	2.1mm	214TP5205	214TP5210	214TP5215	214TP52	214GK52	214GD52
	3.2mm	214TP5305	214TP5310	214TP5315	214TP53	214GK54	214GD54
	4.6mm	214TP5405	214TP5410	214TP5415	214TP54	214GK54	214GD54
<b>214ATP C4 Columns</b>							
5µm	2.1mm	—	—	—	214ATP52	—	—
	4.6mm	—	—	—	214ATP54	—	—
<b>219TP Diphenyl</b>							
3µm	4.6mm	219TP3405	219TP3410	—	—	219GK34	219GD34
5µm	1.0mm	219TP5105	219TP5110	219TP5115	219TP51	219GK51	219GD51
	2.1mm	219TP5205	219TP5210	219TP5215	219TP52	219GK52	219GD52
	3.2mm	219TP5305	219TP5310	219TP5315	219TP53	219GK54	219GD54
	4.6mm	219TP5405	219TP5410	219TP5415	219TP54	219GK54	219GD54
<b>238TP C18</b>							
3µm	4.6mm	238TP3405	238TP3410	—	—	238GK34	238GD34
5µm	1.0mm	238TP5105	238TP5110	238TP5115	238TP51	238GK51	238GD51
	2.1mm	238TP5205	238TP5210	238TP5215	238TP52	238GK52	238GD52
	3.2mm	238TP5305	238TP5310	238TP5315	238TP53	238GK54	238GD54
	4.6mm	238TP5405	238TP5410	238TP5415	238TP54	238GK54	238GD54

NOTE: Additional column diameters and lengths are available on request. Please contact Grace Davison Discovery Sciences to discuss your requirements.  
<sup>1</sup>A guard kit includes a holder and one guard cartridge; <sup>2</sup>Guard cartridge units include two guard cartridges.

hplc columns | large molecule

### related products

For prep Vydac® TP Columns, see our prep section pages 158–160.

### related products

Looking for HPLC column prefilters? See page 111.



### related products

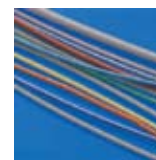
Need high-pressure polymeric fittings? See pages 112–114 for our full selection of high-pressure fittings.

### technical assistance

Contact Tech Support: Phone: 1.800.255.8324 (North America)  
 Email: [contact.alltech@grace.com](mailto:contact.alltech@grace.com)  
 Online: [www.discoverysciences.com](http://www.discoverysciences.com)

### related products

Need HPLC tubing? See pages 384–391.



# Vydac® ProZap™ C18

VYDAC

## Ultra Fast Protein and Peptide Separations

- 10 times faster bioseparations than traditional column formats
- Ultra-high efficiency 1.5µm packing
- Fast protein and peptide separations with conventional HPLC systems

ProZap™ 1.5µm, 500Å packings are ideal for fast bioseparations in life science applications. The combination of ProZap™ packings and short, 10mm Expedite™ column hardware delivers not only faster sample throughput, but also low back pressures suitable for conventional LC systems.

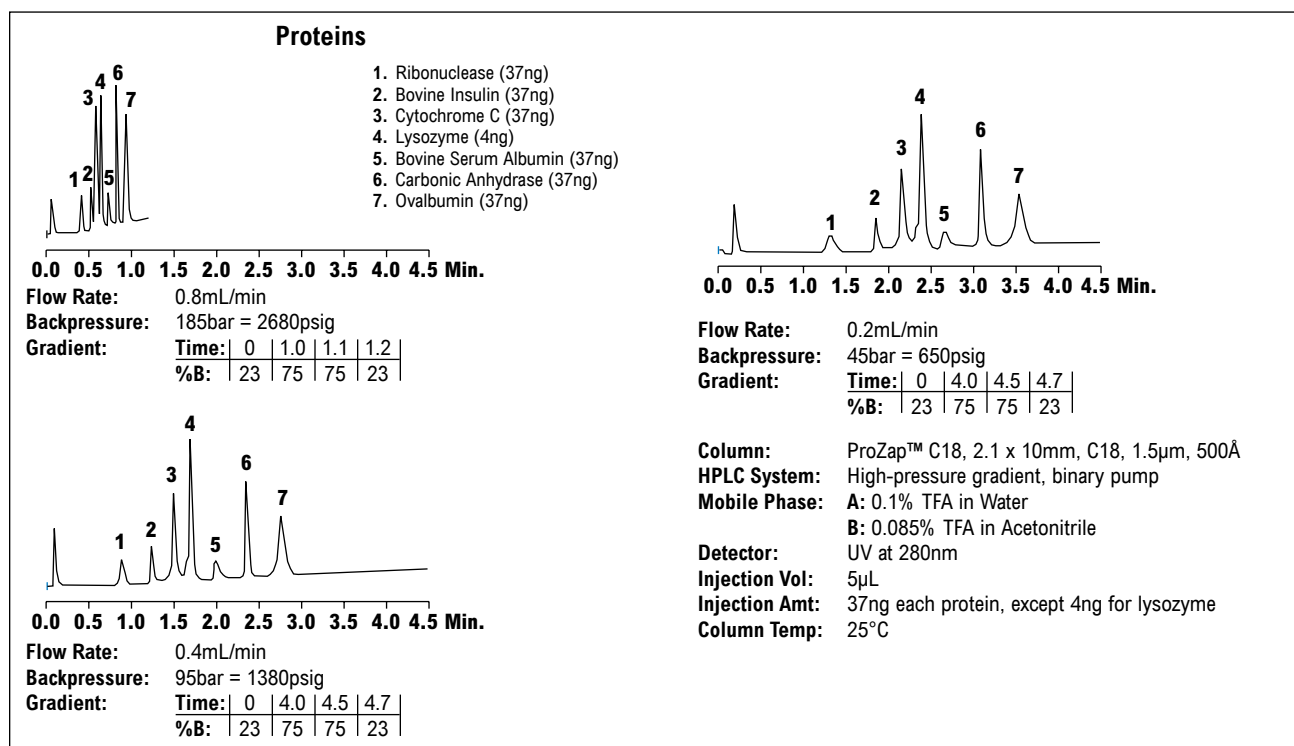


7279

## Optimization of Gradient Parameters for Fast Protein Analysis

Short ProZap™ columns are the perfect tool for fast reversed-phase protein separations. Under gradient conditions, longer columns only increase run time and do not increase resolution to improve the separation. Proteins adsorb at the head of the column and then desorb once the critical mobile phase concentration is reached. Since the proteins do not interact with the full length of the packed bed, short columns are sufficient for full resolution. Therefore, proteins of broad molecular weight ranges can be separated in less than one minute by combining short columns, higher flow rates, and fast, modified gradients. For best results high-pressure mixing should be used with fast gradients.

ProZap™ C18 Specifications									
Phase	Base Material	Particle Shape	Particle Size	Pore Size	Surface Area	Carbon Load	Phase Type	Endcapped?	USP L-code
C18 ProZap	Silica	Spherical	1.5µm	500Å	59m <sup>2</sup> /g	3%	Monomeric	Yes	L1



Seven proteins were tested on a 10mm ProZap™ column. By increasing flow rate and reducing gradient time, total run time is reduced from 4.5 minutes to 1.2 minutes.

### more info

For more information about the Expedite™ hardware format, see page 31.



6113

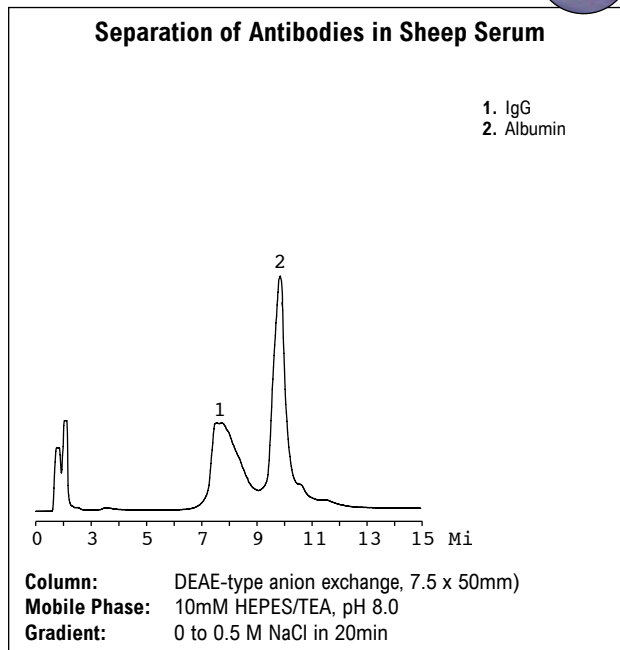
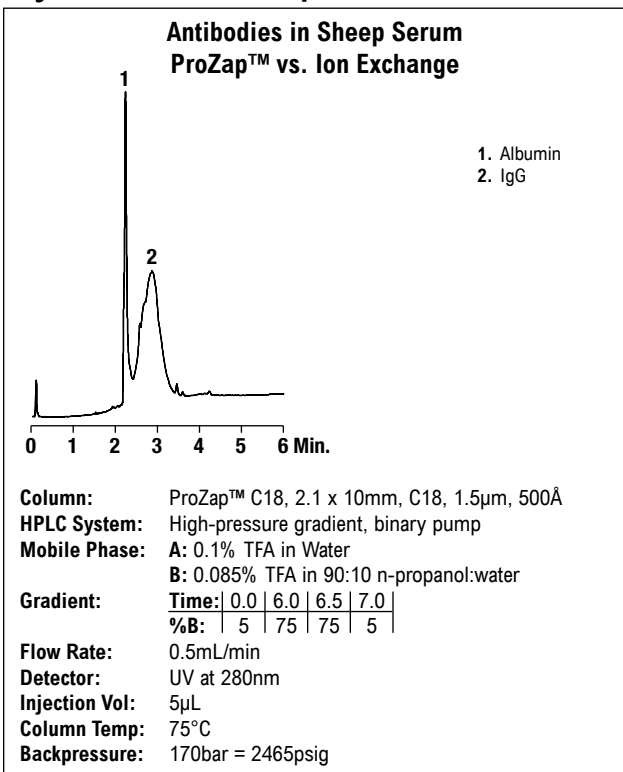
### more applications

To view our complete searchable chromatogram database visit [www.discoverysciences.com/chromdb/](http://www.discoverysciences.com/chromdb/)

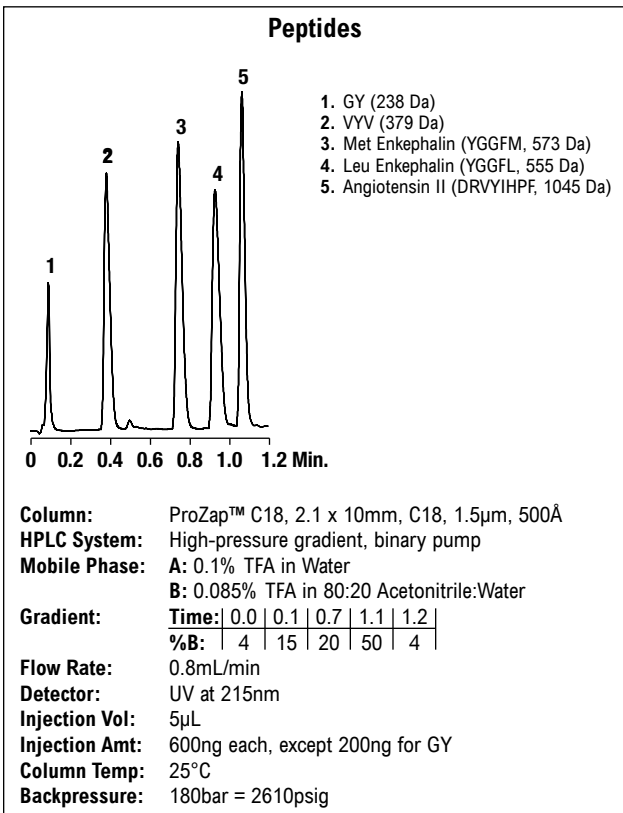




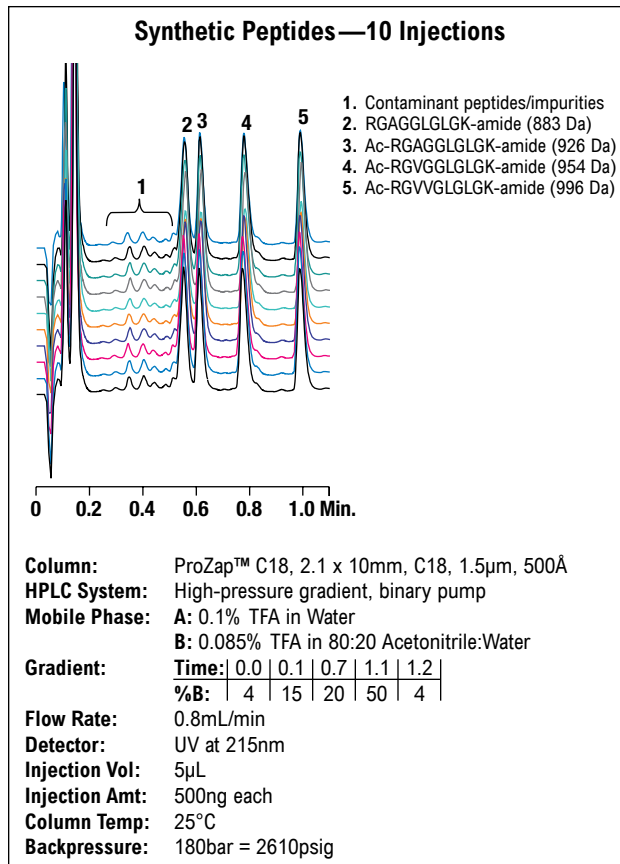
# Vydac® ProZap™ Columns



Vydac® ProZAP™ columns separate intact IgG antibodies (150 kDa) rapidly. Other traditional HPLC methods, such as ion exchange take longer and typically involve the use of non-volatile buffers.



Peptides under one minute.



Reproducibly separate synthetic peptides can be in one minute.

#### ProZap™ (1.5µm)

Dimension	2.1 x 10mm	2.1 x 20mm	4.6 x 10mm	4.6 x 20mm	7 x 33mm
Part No.	35585	35587	35586	35588	35589

# Vydac® Venture® A

## Protein A Affinity Columns for Antibody Purification

- High binding capacity for polyclonal and monoclonal antibodies
- No non-specific binding—patented ICEtech™ (*Inert Coating Enhancement Technology, U.S. Patent No. 6,802,966*) completely passivates the silica surface to ensure highly purified antibodies
- Long lifetime—proven over 300 runs
- Standard HPLC column format uses biocompatible PEEK hardware for use with HPLC or FPLC instruments

The Venture® A column is the first affinity column to take advantage of silica's rigid porous structure, providing increased productivity over other supports. Grace's patented technology, ICEtech™ (inert coating enhancement technology), eliminates non-specific binding on the silica surface enabling the breakthrough use of silica for affinity separations.

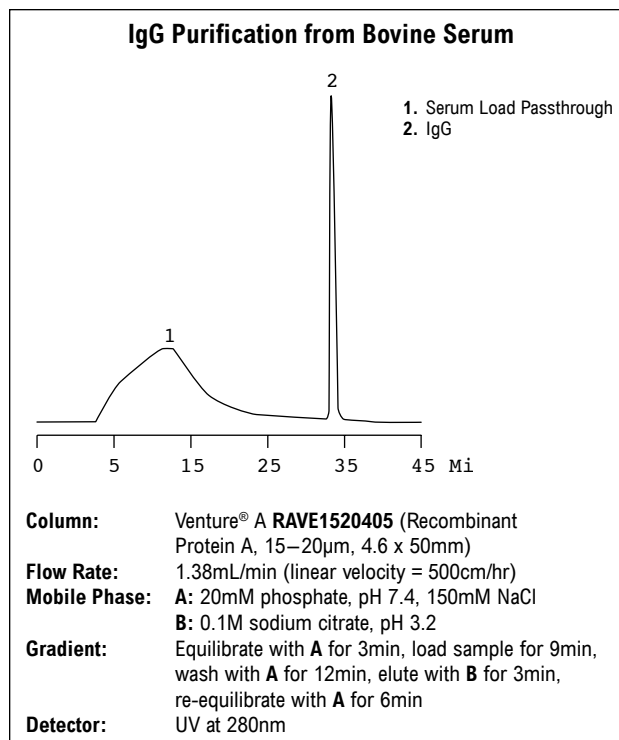
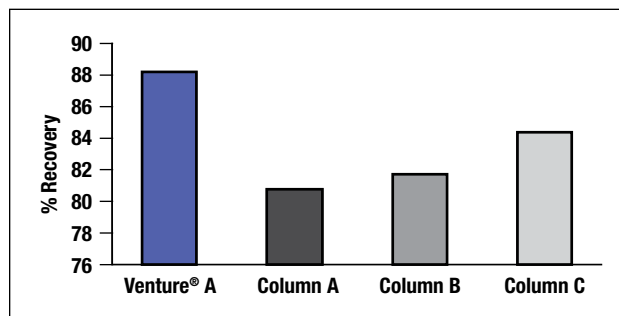
Venture® A columns use a recombinant protein A ligand for binding antibodies. They are designed to perform both as an analytical tool for fast, accurate measurement of antibody titers and as a quick and easy way to purify antibodies from cell culture supernate, serum, or other feedstocks.

Venture® A Characteristics	
<b>Composition:</b>	Wide-porous spherical silica treated with ICEtech™ surface passivation technology
<b>Particle Size:</b>	15–20µm
<b>Ligand:</b>	Recombinant protein A
<b>pH Range:</b>	pH 1 to 8 (long term), pH 1 to 9 (short term)
<b>Pressure:</b>	Maximum operating pressure = 3000psig (200bar)
<b>Recommended Mobile-Phase Velocity:</b>	500cm/h
<b>Mobile-Phase Velocity Range:</b>	150–5000cm/h
<b>Delivery Conditions:</b>	20% ethanol
<b>Storage:</b>	At +4 to +8°C in 20% ethanol
<b>Chemical Stability:</b>	Stable in all aqueous buffers with pH 1 to 8 commonly used in protein A chromatography

Static Capacity of Venture® A Affinity Columns	
<b>Polyclonal</b>	
Species	Capacity (mg/mL)
human	40
bovine	23
mouse	38
rabbit	37
sheep	13
<b>Monoclonal</b>	
Subclass	Capacity (mg/mL)
IgG1 Kappa	15
IgG2a	29
IgG2b	23

**High Recovery: Experience Up to a 10% Improvement in Recovery Compared to Other Commercially Available Columns, Increasing Your Yield and Measurement Accuracy**

20mM Phosphate and 0.15M NaCl Buffer pH 7.4 was loaded on each column up to 90% of the total capacity. After loading the columns were washed with phosphate buffer and the IgG eluted with citrate buffer pH 3.2.



Venture® A Affinity Columns			
Particle Size	i.d.	50mm	100mm
15–20µm	2mm	RAVE1520205	—
	4.6mm	RAVE1520405	RAVE1520410
	7.5mm	—	RAVE1520710

NOTE: Additional column diameters and lengths are available on request. Please contact Grace Davison Discovery Sciences to discuss your requirements.

hplc columns | large molecule

### related products

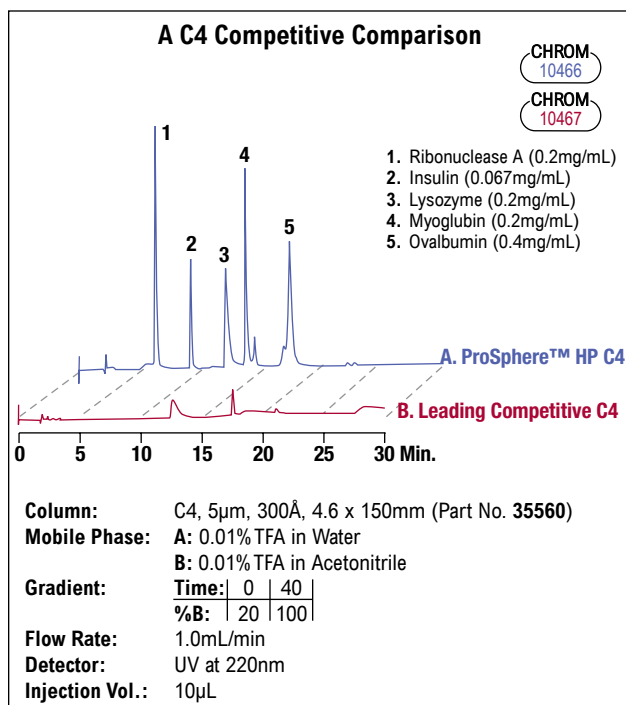
Venture® Immunoaffinity columns are also developed for small molecules, which have been fully validated. Applications areas include: **Food** (Aflatoxin, Lactoferrin, Vitamin B12, Testosterone, Nortestosterone), **Endocrine Disruptors** (17α-Ethynyl Estradiol, 17β-Estradiol, Estrone, Bisphenol A) and **Pollutants** (Chlorophenoxy Acetic Acid Herbicides, Phenylurea Herbicides, Organophosphorus Pesticides, Vincllozolin Fungicide). For details, visit [www.discoverysciences.com](http://www.discoverysciences.com).



# Alltech® ProSphere™ HP 300Å Columns

- High recoveries at low sample concentrations and low TFA concentrations
- Use for protein, peptides, sequencing, nucleic acid fragments
- pH range 2–7.5

These columns produce sharp symmetrical peaks even for basic biomolecules. The 300Å pores allow access of large proteins while still maintaining high resolution of small peptides.



Even at very low concentrations of TFA, ProSphere™ HP C4 exhibits excellent recoveries; significantly better than a leading competitive C4 column.

## ProSphere™ HP 300Å HPLC Columns

Packing	Format	i.d. x Length	Part No.
C18, 3µm*	Capillary	0.150 x 50mm	35510
	Capillary	0.150 x 150mm	35423
	Capillary	0.150 x 150mm	35516
	Capillary	0.300 x 50mm	35511
	Capillary	0.300 x 100mm	35424
	Capillary	0.300 x 150mm	35517
	Solvent Reducer	3.0 x 50mm	35512
	Solvent Reducer	3.0 x 150mm	35518
	Analytical	4.6 x 50mm	35513
	Analytical	4.6 x 150mm	35520
C18, 5µm	Solvent Reducer	3.0 x 150mm	35519
	Solvent Reducer	3.0 x 250mm	35522
	Analytical	4.6 x 150mm	35521
C4, 3µm*	Analytical	4.6 x 250mm	35523
	Capillary	0.150 x 50mm	35533
	Capillary	0.150 x 150mm	35464
C4, 5µm	Capillary	0.150 x 150mm	35539
	Capillary	0.300 x 50mm	35534
	Capillary	0.300 x 100mm	35465
	Capillary	0.300 x 150mm	35545
	Solvent Reducer	3.0 x 50mm	35535
	Solvent Reducer	3.0 x 150mm	35547
	Analytical	4.6 x 50mm	35536
	Analytical	4.6 x 150mm	35549
	Solvent Reducer	3.0 x 150mm	35548
	Solvent Reducer	3.0 x 250mm	35561
C4, 5µm	Analytical	4.6 x 150mm	35560
	Analytical	4.6 x 250mm	35562

\*5µm, 10µm particles and other dimensions are also available.

## ProSphere™ HP 300Å All-Guard™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
300Å C18, 5µm	3.0 x 7.5mm	3	35526
	4.6 x 7.5mm	3	35527
HP C18, 3µm	0.150 x 10mm	—	22668
Capillary Guard**	0.300 x 10mm	—	22669
300Å C4, 5µm*	3.0 x 7.5mm	3	35565
	4.6 x 7.5mm	3	35566
HP C4 Capillary Guard**	0.150 x 10mm	—	22678
	0.300 x 10mm	—	22679
All-Guard™ Cartridge Holder (Includes Direct-Connect Column Coupler)		ea	80101
Capillary Guard Cartridge Holder			
Guard Holder for 0.100mm and 0.150mm Guards		ea	GR-3710E
Guard Holder for 0.300mm and 0.500mm Guards		ea	GR-3710A

\*All-Guard™ holder required. Other particle sizes available.

\*\*5µm, 10µm particles and other dimensions are also available.

Table 1—Percent Protein Recovery at Low Sample Concentration

Phase	Insulin		Ribonuclease A		Lysozyme		Bovine Serum Albumin		Human Serum Albumin	
	0.02mg/mL	0.4mg/mL	0.02mg/mL	0.4mg/mL	0.02mg/mL	0.4mg/mL	0.02mg/mL	0.4mg/mL	0.02mg/mL	0.4mg/mL
ProSphere™ HP C18	68	94	74	94	45	87	65	90	66	87
A Leading Competitive C18	13	90	0	84	0	74	0	63	0	63
ProSphere™ HP C4	79	95	79	94	64	92	74	93	72	89
A Leading Competitive C4	31	93	53	91	20	75	0	53	0	68

Every column has good recoveries with high sample concentrations. How does your column compare at low sample concentrations? ProSphere™ HP 300Å phases outperform a leading competitor at 0.02mg/mL.

### related products

Looking for ProSphere™ prep columns?

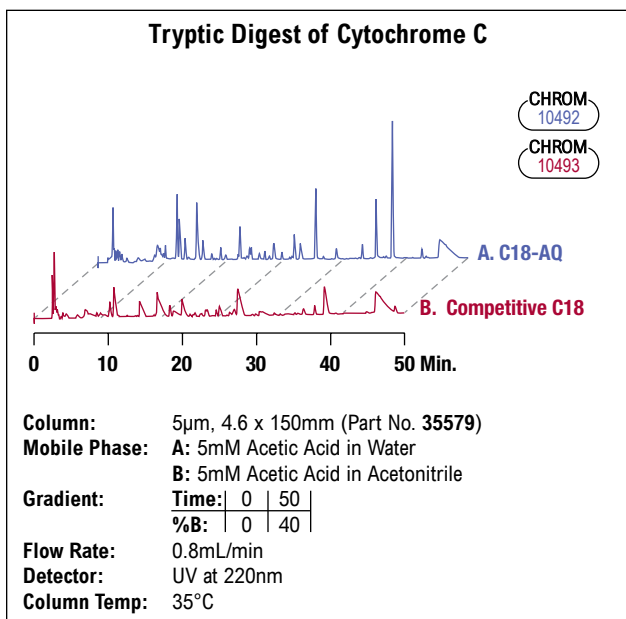
See page 161.

# Alltech® ProSphere™ HP C18-AQ Columns

## Ideal for Peptide Mapping

- Stable from 100% aqueous to 100% organic mobile phases
- Compatible with a broad range of LC/MS compatible mobile phases

ProSphere™ HP C18-AQ Specifications	
Base Material	Silica
Particle Size	3µm, 5µm
Pore Size	100Å
pH Range	2–8



This water-wettable phase is ideally suited for LC/MS and delivers more peaks than traditional C18 phases.

### ProSphere™ HP C18-AQ HPLC Columns

Packing	Format	i.d. x Length	Part No.
C18-AQ, 3µm	Capillary	150µm x 50mm	35568
	Capillary	150µm x 150mm	35574
	Capillary	300µm x 50mm	35569
	Capillary	300µm x 150mm	35575
	Solvent Reducer	3.0 x 50mm	35570
	Solvent Reducer	3.0 x 150mm	35576
C18-AQ, 5µm	Analytical	4.6 x 50mm	35571
	Analytical	4.6 x 150mm	35578
	Solvent Reducer	3.0 x 150mm	35577
	Solvent Reducer	3.0 x 250mm	35580
	Analytical	4.6 x 150mm	35579
	Analytical	4.6 x 250mm	35581

### ProSphere™ HP C18-AQ All-Guard™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
C18-AQ, 5µm	3.0 x 7.5mm	3	35582
	4.6 x 7.5mm	3	35583
All-Guard™ Cartridge Holder (Includes Direct-Connect™ Column Coupler)		ea	80101

\*All-Guard™ holder required. Other particle sizes available.

# Alltech® Macrosphere™ GPC Columns

- 7µm GPC phases separate proteins, peptides, and polar synthetic compounds by size-exclusion

Macrosphere™ GPC Exclusion Limits in Daltons		
Pore Size	Included	Excluded
60Å	250	28,000
100Å	2500	350,000
150Å	4000	500,000
300Å	7500	1,200,000

### Macrosphere™ GPC Columns

Packing	Format	i.d. x Length	Standard Part No.	Waters® Fittings Part No.
GPC 60Å	Analytical	4.6 x 250mm	88129	88130
	Semi-Prep	7.5 x 300mm	88175	—
GPC 100Å	Analytical	4.6 x 250mm	88133	88134
	Semi-Prep	7.5 x 300mm	88177	—
GPC 150Å	Analytical	4.6 x 250mm	88137	88138
	Semi-Prep	7.5 x 300mm	88179	—
GPC 300Å	Analytical	4.6 x 250mm	88141	88142
	Semi-Prep	7.5 x 300mm	88181	—

### Macrosphere™ GPC All-Guard™ Cartridges\*

Packing, 5µm	i.d. x Length	Qty.	Part No.
GPC	4.6 x 7.5mm	3	96133
All-Guard™ Cartridge Holder (Includes Direct-Connect™ Column Coupler)		ea	80101

\*All-Guard™ holder required. Other particle sizes available.

# Alltech® Macrosphere™ Ion-Exchange Columns

- 300Å weak and strong ion-exchange phases separate proteins, enzymes, and other biologicals

### Macrosphere™ Ion-Exchange Specifications

	Exchange Group	Exchange Capacity
WAX	Diethylaminoethane	0.13 meq/gram
WCX	Carboxylic Acid	0.49 meq/gram
SAX	Quaternary Ammonium	0.14 meq/gram
SCX	Sulfonic Acid	0.50 meq/gram

### Macrosphere™ Ion-Exchange Columns

Packing	Format	i.d. x Length	Part No.
WAX, 7µm	Analytical	4.6 x 150mm	71151
	Analytical	4.6 x 250mm	71154
WCX, 7µm	Analytical	4.6 x 150mm	71157
	Analytical	4.6 x 250mm	71160
SAX, 7µm	Analytical	4.6 x 150mm	72303
	Analytical	4.6 x 250mm	72603
SCX, 7µm	Analytical	4.6 x 150mm	72308
	Analytical	4.6 x 250mm	72608

### Macrosphere™ Ion-Exchange All-Guard™ Cartridges\*

Packing	i.d. x Length	Qty.	Part No.
WAX, 5µm	4.6 x 7.5mm	3	96135
WCX, 5µm	4.6 x 7.5mm	3	96137
SAX, 5µm	4.6 x 7.5mm	3	96139
SCX, 5µm	4.6 x 7.5mm	3	96141
All-Guard™ Cartridge Holder (Includes Direct-Connect™ Column Coupler)		ea	80101

\*All-Guard™ holder required. Other particle sizes available.

# Custom HPLC Columns

## Ordering Instructions

Alltech offers a large selection of packing materials and formats to create your own custom HPLC column.

**Step 1:** Select your packing material and particle size from **Table 1**.

**Step 2:** Select your column format from **Table 2**.

**Step 3:** Call your local Customer Service office for a quote. Indicate phase, particle size, format, and dimensions.



7102a

hplc columns | custom

Table 1—HPLC Packing Materials		
Family	Phase	Particle Sizes
<b>Adsorbosphere™</b> Alltech	C18, C8, CN, NH <sub>2</sub> , Silica, HS C18, HS Silica, UHS C18, Phenyl, CN-AQ, SAX, SCX, OPA HR, OPA HS, CN-AQ, SAX, SCX, OPA HR, OPA HS	3, 5, 10µm
<b>Adsorbosphere™ XL</b> Alltech	C18 300, C8 300, C18, C8, Silica, SAX, SCX, TMS	3, 5, 10µm
<b>Allsphere™</b> Alltech	C8, CN, NH <sub>2</sub> , ODS-2, Silica, C1, ODS-1, Phenyl, C6, SAX, SCX	3, 5µm
<b>Alltima™</b> Alltech	C18, C8, Silica, CN, NH <sub>2</sub> , Phenyl, C18-LL, C18-WP, C4-WP	3, 5, 10µm
<b>Alltima™ HP</b> Alltech	C18, C18 Amide, C18 EPS, C18 HiLoad, C8, CN, Silica	1.5, 3, 5µm
<b>Apollo™</b> Alltech	C18, C8, Phenyl, Silica	5µm
<b>Brava™</b> Alltech	C18 BDS, C18 ODS, C8, Phenyl, Cyano BDS, Cyano, Amino, Silica	3, 5µm
<b>Carbohydrate</b> Alltech	Anomer, NH <sub>2</sub>	10µm
<b>Econosphere™</b> Alltech	C18, C8, Silica, CN, NH <sub>2</sub>	3, 5, 10µm
<b>Everest®</b> VYDAC	C18	5, 10, 15–20µm
<b>GraceAlpha™</b> GRACE	C18, C8, Silica	5, 10, 15, 20µm
<b>Grom™-Sil</b> CROM	ODS-0, ODS-1, ODS-3, ODS-4, ODS-5, ODS-6, ODS-7, C8, C6, C4, C1, CN, NH <sub>2</sub> , DIOL, IEX, Silica	1.5, 3, 5, 7, 10µm
<b>Grom™-Sapphire</b> CROM	C18, C8, C4, Silica	3, 5, 10µm
<b>Ion Chromatography</b> Alltech	Transition Metal, Universal Cation, Surfactant C8, Surfactant C18, Surfactant/R, Allsep™, Allsep™ A-2, Novosep™ A-1	5, 7, 10µm
<b>Kromasil®</b>	C18, C4, C8, NH <sub>2</sub> , Silica	5, 10µm
<b>LiChrosorb®</b>	NH <sub>2</sub> , RP-18, RP-8, RP-Select B, Silica-60, Silica-100	5, 10µm
<b>LiChrospher®</b>	RP-18, RP-18 Endcapped, RP-8, RP-8 Endcapped, Silica-60, CN, NH <sub>2</sub> , Silica-100, RP-Select B	3, 5µm
<b>Macrosphere™</b> Alltech	GPC 60, 100, 150, 300, SAX 300, SCX 300, WAX 300, WCX 300	5, 7µm
<b>Mixed-Mode</b> Alltech	C18/Cation, C8/Anion, C8/Cation	5, 7µm
<b>Nucleosil®</b>	C18, C8, CN, NH <sub>2</sub> , SA, SB, Silica, Phenyl	3, 5, 10µm
<b>Partisil™</b>	C8, ODS-2, ODS-3, PAC, SAX, Silica, ODS, SCX	5, 10µm
<b>Platinum™</b> Alltech	C18-300, EPS C18-300, Silica-300, C18, EPS C18, C8, C18, EPS C18, C8, EPS C8, CN, NH <sub>2</sub> , Phenyl, Silica, SAX	1.5, 3, 5µm
<b>Prevail™</b> Alltech	Amide, Amino, C18, C18 Select, C8, CN, Phenyl, Silica	3, 5µm
<b>ProSphere™ HP</b> Alltech	C18 300, C18 100, C4 300	1.5, 3, 5, 10µm
<b>Spherisorb®</b>	CN, NH <sub>2</sub> , ODS-2, Silica, ODS-1, Phenyl, SAX, SCX	3, 5µm
<b>Vydac® MS</b> VYDAC	C18, C8, C4, Diphenyl	3, 5, 10–15µm
<b>Vydac® TP</b> VYDAC	C18, C8, C4, Diphenyl	3, 5, 10–15µm

Table 2—Custom Part Numbers for HPLC Column Formats				
Format	Custom Part No.	Description	Available Lengths	Available i.d.s
<b>Capillary</b>	Call	Quartz glass Grace capillary columns connect directly to microinjector and via fused silica capillary detectors	5, 10, 20, 50, 75, 100, 150, 250mm	0.075, 0.1, 0.2, 0.3, 0.5, 0.8mm
<b>Analytical, Solvent-Reducer, and LC/MS</b>	C-6000B	Stainless steel analytical column with industry standard female fittings.	30, 50, 100, 150, 250, 300mm	2.1, 3.0, 3.9, 4.1, 4.6mm
<b>Analytical, Waters® Style Endfittings</b>	C-6000C	Stainless steel analytical column with Waters®-style endfittings.	30, 50, 100, 150, 250, 300mm	2.1, 3.0, 3.9, 4.1, 4.6mm
<b>Metal-Free*</b>	C-6000M	Metal-Free columns with industry standard female fittings.*	30, 50, 100, 150, 250, 300mm	2.1 (30 or 100mm lengths only), 4.6, 7.5mm
<b>Rocket™</b>	C-6000R	Fast-analysis columns with Rocket™ endfittings; requires 3µm or smaller particle size.	33, 53mm	7mm
<b>All-Guard™ Cartridges Stainless Steel</b>	C-9800	4/pk All-Guard™ Cartridges, Stainless Steel. Purchase holder <b>80101</b> separately.	7.5mm	2.1, 3.0, 4.6mm
<b>All-Guard™ Cartridges Metal-Free*</b>	C-9400	4/pk All-Guard™ Cartridges, PEEK. Purchase holder <b>80101</b> separately.	7.5mm	4.6mm
<b>Preparative**</b>	C-6000F	Stainless steel preparative column with threaded endfittings.	70, 100, 250, 500mm	7, 10, 22mm
<b>Capillary Guards</b>	Call	Create a zero dead volume finger-tight connection to capillary columns.	5, 10, 20mm	0.1, 0.15, 0.3, 0.5mm

\*Metal-Free columns are available with ProSphere™ and Ion Chromatography packings only.  
 \*\*Additional custom prep columns available, see pages 162–170.

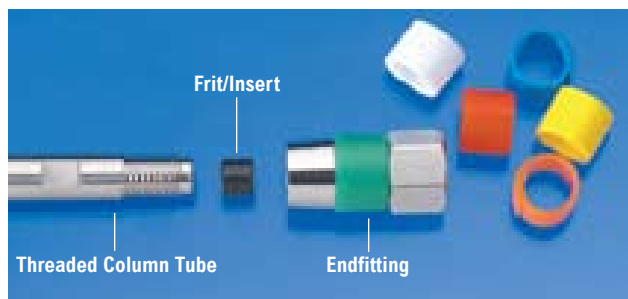
### more info

For more information on our column formats, see page 31.

# Empty HPLC Hardware

## Stainless Steel Analytical Column Hardware

- Threaded tube for easy assembly
- Type 316 stainless steel construction
- Column i.d. of 2.1, 3.2, 3.9, 4.1, and 4.6mm



5319

Stainless steel analytical columns come complete with the threaded tube, two 2µm industry standard frit/inserts, and two stainless steel endfitting nuts. Removable color-coded bands available separately, (Part No. 93237). Industry standard frit/inserts contain a stop depth equal to 0.100" (see Figure 1). Optional 0.5µm porosity frit/inserts are also available.

Adapters and sealing rings are available for slurry packing your own columns (see Figure 2). The packing adapter comes with a 1/4" precolumn tube to connect to 1/4" slurry reservoirs.

Stainless Steel Analytical Column Hardware Specifications	
<b>Material:</b>	316 Stainless Steel
<b>Max. Temperature:</b>	100°C
<b>Max. Pressure:</b>	10,000psig
<b>Thread Type:</b>	10-32 UNF (CPI Standard Ports)
<b>Typical Use:</b>	Analytical HPLC Columns

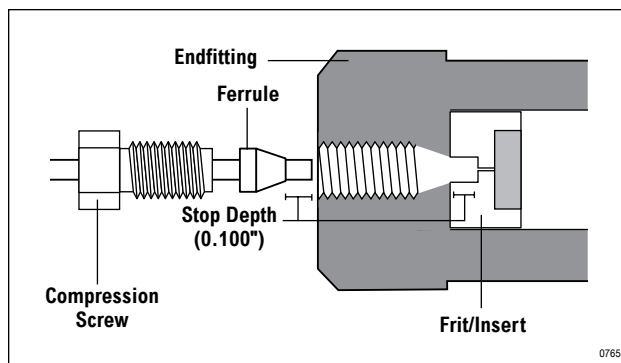


Figure 1—Stainless steel analytical columns have ports with industry standard stop depth.

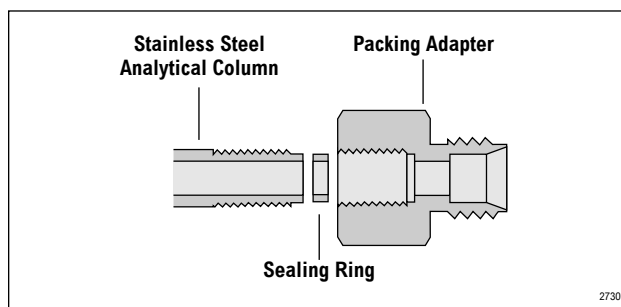


Figure 2—Packing adapter threads directly onto stainless steel analytical column tube.

### Stainless Steel Analytical Hardware and Accessories

Description	2.1mm i.d. Part No.	3.2mm i.d. Part No.	3.9mm i.d. Part No.	4.1mm i.d. Part No.	4.6mm i.d. Part No.
<i>Complete Columns</i>					
50mm	65175	65170	65165	65160	65150
100mm	65176	65171	65166	65161	65152
150mm	65177	65172	65167	65162	65154
250mm	65178	65173	65168	65163	65156
300mm	65179	65174	65169	65164	65158
<i>Replacement Parts</i>					
Endfitting (ea)	75001	75001	75001	75001	75001
Frit/Insert, 2µm (5/pk)	75028	75026	75024	75022	75020
Frit/Insert, 0.5µm (5/pk)	75029	75027	75025	75023	75021
<i>Packing Accessories</i>					
Packing Adapter (ea)	65189	65188	65187	65186	65185
Sealing Rings (10/pk)	65199	65198	65197	65196	65195

## Empty HPLC Hardware

### Stainless Steel Preparative Column Hardware

- Threaded format for easy assembly
- Extended column life with the patented continuously adjustable piston (CAP™)
- Column i.d. of 7, 10, and 22mm

The Alltech® easy-to-use preparative format has threaded endfittings and a continuously adjustable piston/frit (CAP™). The piston/frit extends column life by compressing the packed bed to remove voids.



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#### Stainless Steel Preparative Column Hardware Specifications

<b>Material:</b>	316 Stainless Steel, PEEK
<b>Max. Temperature:</b>	100°C
<b>Max. Pressure:</b>	8000psig
<b>Thread Type:</b>	10-32 UNF (CPI Standard Ports)
<b>Typical Use:</b>	Prep HPLC Columns

#### Stainless Steel Preparative Hardware and Accessories

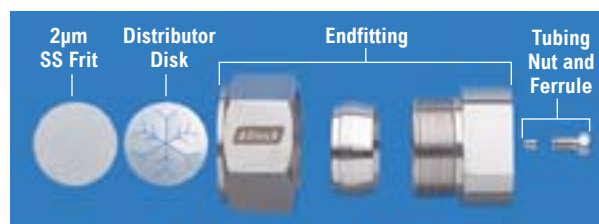
i.d.	Length	Qty.	Part No.
<i>Complete Columns</i>			
7mm	100mm	ea	<b>96500</b>
7mm	250mm	ea	<b>96501</b>
7mm	500mm	ea	<b>96502</b>
10mm	100mm	ea	<b>96510</b>
10mm	250mm	ea	<b>96511</b>
10mm	500mm	ea	<b>96512</b>
22mm	70mm	ea	<b>96524</b>
22mm	100mm	ea	<b>96520</b>
22mm	250mm	ea	<b>96521</b>
22mm	500mm	ea	<b>96522</b>
<i>Replacement Endfittings</i>			
7mm	—	ea	<b>96505</b>
10mm	—	ea	<b>96515</b>
22mm	—	ea	<b>96525</b>
<i>Replacement Piston/Frit, 2µm</i>			
7mm	—	ea	<b>96507</b>
10mm	—	ea	<b>96517</b>
22mm	—	ea	<b>96527</b>
<i>Packing Adapters*</i>			
7mm	—	ea	<b>96508</b>
10mm	—	ea	<b>96518</b>
<i>Packing Seals*</i>			
7mm	—	10	<b>96509</b>
10mm	—	10	<b>96519</b>

\*22mm packing adapters and seals are not available.

### Stainless Steel Swaged Column Hardware

- Passivated stainless steel for a more inert surface
- Uses precision bore tubing and OptiFlow™ endfittings
- Column i.d. of 2.1, 3.2, 4.6, 10, and 22.5mm

Stainless steel swaged hardware uses precision bore seamless tubing and OptiFlow™ endfittings. It is the ideal choice when standard column lengths are not desirable—just cut to your specification. OptiFlow™ endfittings have a flow distributor which spreads the sample and eluant across the entire frit surface to improve peak symmetry and prevent frit blockage.



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#### Precision Bore HPLC Column Tubing Specifications

<b>Material:</b>	316 Stainless Steel
<b>Max. Temperature:</b>	500°C
<b>Max. Pressure:</b>	8000psig
<b>Typical Use:</b>	HPLC Column Assembly w/Swageable Endfittings

#### Precision Bore Tubing

o.d. x i.d.	Per Foot Part No.	Per Meter Part No.
<i>Precision Bore Tubing</i>		
1/8" x 2.1mm	<b>3012</b>	<b>30120</b>
1/4" x 2.1mm	<b>3013</b>	<b>30130</b>
1/4" x 3.2mm	<b>3011</b>	<b>30110</b>
1/4" x 4.6mm	<b>3015</b>	<b>30150</b>

#### OptiFlow™ Endfittings\*

Description	For use with Tubing i.d.	Qty.	Part No.
<i>OptiFlow™ Endfittings</i>			
1/4"	2.1, 3.2, 4.6mm	ea	<b>400612</b>
3/8"	7.0mm	ea	<b>10123</b>
1/2"	10.0mm	ea	<b>9205</b>
1"	2.25mm	ea	<b>9204</b>

\*Each fitting is supplied with a nut and ferrule for 1/16" tubing, a 2-micron stainless steel frit and distributor disk.

#### related products

Additional prep hardware also available. See page 150.

## Stainless Steel Frits

- Type 316 stainless steel
- Heat-passivated for a more inert surface

Stainless Steel Frit Specifications	
<b>Material:</b>	316 Stainless Steel
<b>Max. Temperature:</b>	500°C
<b>Max. Pressure:</b>	10,000psig
<b>Typical Use:</b>	Column Inlet/Outlet

### Stainless Steel Frits

Frit Diameter	Thickness	Porosity	5/pk Part No.	25/pk Part No.
1/4" (6.350mm)	0.031" (0.79mm)	0.5µm	<b>720805</b>	<b>720825</b>
	0.031" (0.79mm)	2.0µm	<b>721005</b>	<b>721025</b>
	0.063" (1.59mm)	2.0µm	<b>716505</b>	<b>716525</b>
3/8" (9.525mm)	0.031" (0.79mm)	0.5µm	<b>721205</b>	<b>721225</b>
	0.031" (0.79mm)	2.0µm	<b>721405</b>	<b>721425</b>
	0.063" (1.59mm)	0.5µm	<b>718005</b>	<b>718025</b>
	0.063" (1.59mm)	2.0µm	<b>718205</b>	<b>718225</b>
1/2" (12.7mm)	0.031" (0.79mm)	0.5µm	<b>721605</b>	<b>721625</b>
	0.031" (0.79mm)	2.0µm	<b>721805</b>	<b>721825</b>
1" (25.4mm)	0.031" (0.79mm)	2.0µm	<b>722205</b>	<b>722225</b>
	0.063" (1.59mm)	2.0µm	<b>718605</b>	<b>718625</b>



## Encased Stainless Steel Frits

- Improved sealing over conventional frits
- Better mechanical stability

Encased Stainless Steel Frit Specifications	
<b>Material:</b>	316 Stainless Steel, PEEK, or Graph-Tite™
<b>Max. Temperature:</b>	100°C
<b>Max. Pressure:</b>	10,000psig
<b>Typical Use:</b>	Column Inlet/Outlet

### Encased Stainless Steel Frits

Frit Diameter	Ring Diameter	Thickness	0.5 Micron (5/pk) Part No.	2 Micron (5/pk) Part No.	2 Micron (10/pk) Part No.	2 Micron (20/pk) Part No.
<i>Stainless Steel Frits with PEEK Ring</i>						
0.083" (2.1mm)	0.250" (6.4mm)	0.063" (1.59mm)	—	—	<b>9900</b>	<b>99001</b>
0.125" (3.2mm)	0.250" (6.4mm)	0.063" (1.59mm)	—	—	<b>9902</b>	<b>99021</b>
0.156" (4.0mm)	0.250" (6.4mm)	0.063" (1.59mm)	—	—	<b>9906</b>	<b>99061</b>
0.273" (7.0mm)	0.375" (9.5mm)	0.063" (1.59mm)	—	—	<b>9910</b>	<b>99101</b>
0.352" (10mm)	0.500" (12.7mm)	0.063" (1.59mm)	—	—	<b>9912</b>	<b>99121</b>
<i>Stainless Steel Frits with Carbon-Reinforced PEEK Ring</i>						
0.083" (2.1mm)	0.250" (6.4mm)	0.031" (0.79mm)	<b>75015</b>	<b>75014</b>	—	—
0.125" (3.2mm)	0.250" (6.4mm)	0.031" (0.79mm)	<b>75013</b>	<b>75012</b>	—	—
0.181" (4.6mm)	0.250" (6.4mm)	0.031" (0.79mm)	<b>75006</b>	<b>75005</b>	—	—

## Encased Metal-Free PEEK Frits

- Metal-free inert construction
- Ideal for chromatography biocompatibility applications

Encased Metal-Free PEEK Frit Specifications	
<b>Material:</b>	PEEK
<b>Max. Temperature:</b>	100°C
<b>Max. Pressure:</b>	10,000psig
<b>Typical Use:</b>	Column Inlet/Outlet

### Encased Metal-Free PEEK Frits

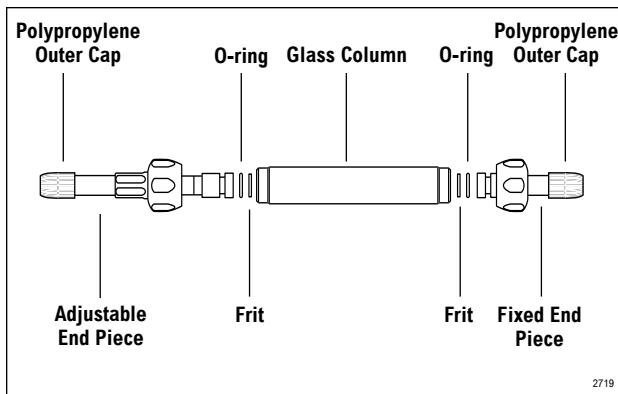
Frit Diameter	Ring Diameter	Thickness	5 Micron (5/pk) Part No.	10 Micron (5/pk) Part No.
<i>PEEK Frits with PEEK Ring</i>				
0.125" (3.2mm)	0.250" (6.4mm)	0.063" (1.59mm)	<b>69025</b>	<b>69026</b>
0.181" (4.6mm)	0.250" (6.4mm)	0.063" (1.59mm)	<b>68152</b>	<b>69027</b>
0.312" (7.9mm)	0.375" (9.5mm)	0.063" (1.59mm)	<b>67152</b>	<b>69028</b>

# Empty Low-Pressure Hardware

## Omnifit® Low-Pressure Column Hardware

- Borosilicate heavy wall glass with precision threaded ends and patented “strain free” endfittings
- Bore diameter constant to ±0.1mm
- Higher pressure limits than other low-pressure column hardware

Each Omnifit® glass column includes two PTFE end pieces (one fixed, one adjustable), two 1/4-28 polypropylene outer caps, one frit kit (two each: 10µm polyethylene, 10µm PTFE and 25µm PTFE), two flangeless tube endings, two gripper fittings, and two meters of 1/16" PTFE tubing.



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### Omnifit® Column Hardware Specifications

<b>Material:</b>	Borosilicate Glass, PTFE, Fluoroelastomer Polymer, Polypropylene, and Polyethylene
<b>Max. Temperature:</b>	100°C
<b>Max. Pressure:</b>	Varies, See Price Block
<b>Thread Type:</b>	1/4-28 UNF
<b>Typical Use:</b>	Low-pressure, Metal-free Columns

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### Omnifit® Glass Columns

Length	Part No.
<i>6.6mm i.d. Column, rated to 60Atm (900psig)</i>	
100mm	62271
150mm	62272
250mm	62273
400mm	62276
<i>10mm i.d. Column, rated to 40Atm (600psig)</i>	
100mm	61110
150mm	61120
250mm	61140
500mm	61160
1000mm	61180
<i>15mm i.d. Column, rated to 20Atm (300psig)</i>	
100mm	64110
150mm	64120
250mm	64140
500mm	64160
1000mm	64180
<i>25mm i.d. Column, rated to 10Atm (150psig)</i>	
150mm	62121
250mm	62141
500mm	62161
1000mm	62181

### Omnifit® Glass Column Accessories

Description	Qty.	Part No.
<i>6.6mm i.d. Column Accessories</i>		
Adjustable Plunger	ea	62287
25µm Polyethylene Frits	20	62281
25µm PTFE Frits	20	62282
10µm PTFE Frits	20	62283
5µm PTFE Frits	20	62284
Fluoroelastomer Polymer O-rings	10	62285
Silicone O-rings	10	62286
<i>10mm i.d. Column Accessories</i>		
Adjustable Plunger	ea	61651
25µm Polyethylene Frits	20	61411
25µm PTFE Frits	20	61421
10µm PTFE Frits	20	61461
5µm PTFE Frits	20	61471
Fluoroelastomer Polymer O-rings	10	61661
Silicone O-rings	10	61671
<i>15mm i.d. Column Accessories</i>		
Adjustable Plunger	ea	64651
25µm Polyethylene Frits	20	64411
25µm PTFE Frits	20	64421
10µm PTFE Frits	20	64461
5µm PTFE Frits	20	64471
Fluoroelastomer Polymer O-rings	10	64661
Silicone O-rings	10	64671
<i>25mm i.d. Column Accessories</i>		
Adjustable Plunger	ea	62651
25µm Polyethylene Frits	20	62411
25µm PTFE Frits	20	62421
10µm PTFE Frits	20	62461
5µm PTFE Frits	20	62471
Fluoroelastomer Polymer O-rings	10	62661
Silicone O-rings	10	62671

### related products

Looking for low-pressure accessories?

Low-pressure fittings, pages 117–120;

Low-pressure tubing, page 387.